



# CEI Service Delivery Process Equivalence Options

Analysis of alternative service delivery approaches

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By Pedro Pedroso and Michael Dargue

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Registered Office Address: Descartes House, 8 Gate Street, London WC2A 3HP United Kingdom

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### Executive Summary

In April 2016, Cartesian was engaged by the Commission for Communications Regulation (ComReg) to review Eircom's Regulated Wholesale Poles and Ducts products in Ireland and identify potential changes to the process and systems supporting these products.

The scope of our study included potential changes to improve the current Equivalence of Outputs (EOO) service delivery model, and others that would be required for an Equivalence of Inputs (EOI) service delivery model. For the options identified, Cartesian was requested to estimate the cost and effort that would be required if the changes were implemented.

Cartesian examined the current Eircom Civil Engineering Infrastructure (CEI) products from both product and business-process perspectives. Overall, we found that: operators have limited access to data for network planning; there is a very high degree of reliance on Eircom for fulfilment; and, limitations on service assurance place a significant business risk on operators using these products.

We have conducted case studies of the regulatory environment and the physical infrastructure access products on offer from the operators with significant market power (SMP operators) in three other European countries: France, Portugal and the UK. These have assisted us in identifying aspects of Eircom's product which could be improved. Portugal shows a number of practices which facilitate the consumption of physical infrastructure access, and common to all three countries was a self-service delivery model which gives more control to the operators.

Our identified options for improving the current EOO service delivery model across both CEI products (duct and pole) reduce the dependency on Eircom's activities and interventions, and provide more control to the operators.

Options for improving the Duct Access product include:

- Sharing more detailed duct information with the Other Authorized Operators (OAOs) to enable them to do their own desk surveys
- Recording available duct capacity, and making this information available to OAOs
- Allowing OAOs to conduct the required field work themselves if they so choose (survey; rod, rope and test; sub-duct and cable installation)

Options for improving the Pole Access product include:

- Recording pole inventory/structural and capacity usage information in a physical inventory system and making this available upfront to OAOs in the survey phase
- Recording the output of network design activity in the inventory system

A number of options were common to both products:

- Defining types of minor faults and priority levels for resolution
- Providing dedicated customer support channels for CEI faults
- Separating the account management, commercial and technical support functions
- Establishing operational Key Performance Indicators (KPIs) and adopting more stringent Service Level Agreements (SLAs)

We also considered options for moving to an Equivalence of Inputs (EOI) model, which would change the way Eircom consumes the CEI products. Under the EOI model Eircom would consume products in the same way as OAOs, and a list of new internal activities for Eircom has been identified:

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- Use of same data sources, systems and processes
- Use of same orders forms, channels and SLAs
- Implementation of a data governance model

Enhancing the current EOO service delivery model, or transitioning to an EOI service delivery model, would require changes to Eircom's processes and systems. To understand the potential impact, Cartesian used industry-standard frameworks to identify those processes and systems that would be affected. These included the following:

- Fulfilment-related processes such as Order Handling, Service Configuration and Activation, Resource Provisioning
- Fulfilment-related Applications such as Customer Self-Management and Resource Inventory Management
- Assurance-related processes such as Problem Handling, Customer Quality of Service (QoS)/SLA Management, Service Problem Management, Service Quality Management
- Customer Interaction Management and Customer Information Management, crossing both the fulfilment and assurance operations

For the impacted systems and processes, Cartesian estimated the required development effort to make the potential changes.

The effort estimates were based on Cartesian's own assumptions, derived from internal experience of delivering business change projects. The assessment was conducted without Eircom's input and Eircom has not validated the outputs. As such, the estimates should be considered as directionally correct rather than absolute.

The estimated cost of the changes for potential improvements to the CEI systems and processes under the EOO service delivery model is €365,000 to €425,000. Costs include the implementation of the revised business processes which includes design, documentation, implementation and training, and the IT development for the impacted business system applications. This estimate excludes the cost of any incremental software licence costs which may be required, e.g. to enable additional functionality in Eircom's existing inventory management system.

Moving to an EOI consumption model would require an estimated additional €100,000 to €118,000 investment in systems and processes. The combined cost of systems and processes for EOI would therefore be in the range of €465,000 to €543,000.

If Eircom were to transition to EOI without making the potential improvements identified for the EOO approach, then the system and process costs would be expected to be similar or less than the combined cost range of €465,000 to €543,000.

### 1. Introduction and Context

In 2013, the Commission for Competition Regulation (ComReg) published its Decision on remedies to be applied with respect to Next Generation Access.<sup>1</sup> Within this decision, access obligations were imposed on Eircom that include providing access to the civil engineering infrastructure (CEI).

To protect against non-price forms of discrimination, Eircom is required to meet specific equivalence standards. The Decision obliged Eircom to deliver CEI products on an Equivalence of Output (EOO) basis.

Since the launch of the CEI products there has been no commercial uptake. Within the context of a wider review of the CEI services, ComReg engaged Cartesian to review Eircom's Regulated Wholesale Poles and Ducts products and identify potential changes to the process and systems supporting these products.

Specifically, Cartesian was requested to:

1. Review Eircom's Regulated Wholesale Poles and Ducts products documentation
2. Compare the Regulated Wholesale Poles and Ducts products with those available in other countries
3. Identify potential processes and / or system changes required for an Equivalence of Inputs (EOI) CEI service delivery model in Ireland
4. Identify potential process and / or system changes to improve the current EOO CEI service delivery model in Ireland
5. Provide an overview of how the identified process and / or systems changes could be implemented for both EOI and EOO CEI
6. Provide an order of magnitude of the cost and the effort required to implement the process changes identified for EOI and EOO CEI options

The study considers the current processes used to deliver the CEI product, and not the scope of the CEI remedy. Also out of scope for the project are pricing, and quantification of the benefits of the identified options.

The potential options considered would support large-scale adoption of the CEI services. Consequently, there is a bias against manual processes in favour of automation and storing information in robust databases.

We have also assumed, backed by our research, that it is desirable to reduce the dependency on manual Eircom activities and interventions, and put more control in the hands of the other authorized operators (OAOs). This assumption is reflected in our identified changes.

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<sup>1</sup> ComReg Decision D03/13

### 2. Methodology

We followed a structured approach, in which we initially built up our understanding of Eircom's current products, assessed areas of weakness, identified potential improvements to the product and estimated the impact that these would have on Eircom's existing processes and systems.

The primary activities are summarised below.

#### 1. Research Eircom's CEI Products

In the first phase we researched Eircom's CEI products for duct and pole access. To obtain a comprehensive view, we looked at the processes from different perspectives. These were: the processes; systems; information generated, exchanged and stored; people and teams involved; and, billing and other charges applied. Information sources included Eircom's published documentation describing the operational and technical aspects of the product and the associated SLAs<sup>2 3 4</sup>, information provided by ComReg regarding CEI processes and systems<sup>5 6 7 8 9 10</sup>, and additional information obtained from Eircom during the course of the project<sup>11</sup>. We also conducted interviews with prospective consumers of the CEI product in order to get their perspectives on its current shortcomings.

#### 2. Develop International Case Studies

We researched international examples of CEI products in three European countries: France, Portugal and the UK. The objective of the research was to gather information on alternative service delivery models, determine factors that may contribute to a successful CEI implementation, and identify examples of best practice that could potentially be applied in Ireland. The international case studies relied mainly on published documentation with selected primary research to address information gaps.

#### 3. Identify Potential Options for Eircom's CEI Products

From the research on the CEI products in Ireland and the case studies, we then identified potential options (process and system changes) that could be applied to either enhance the current EOO service delivery model or transition to an EOI service delivery model. This analysis considered each phase of the service delivery processes and assurance processes for the duct and pole products.

#### 4. Impact Assessment of Potential Options

Finally, we assessed the impact of the potential options in terms of the time and cost required to implement the changes. The assessment considers the effort required in designing, implementing and testing the business process and system changes. Training of operational staff involved in the delivery of these products is also included.

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<sup>2</sup> Eircom Document – Duct Access: Technical & Operational Manual v1.0 – draft version from 27/02/2015, available on Eircom website

<sup>3</sup> Eircom Document – Pole Access: Technical & Operational Manual v1.0 – draft version from 10/08/2015, available on Eircom website

<sup>4</sup> Eircom Document – Pole Access: SLA v1.1 – draft version from 29/02/2016, available on Eircom website

<sup>5</sup> Eircom Document – Duct Access: SLA v1.1 – draft version from 29/02/2016, provided by ComReg

<sup>6</sup> Eircom Document – Duct Access: Product Description v1.2 – draft version from 21/04/2016 provided by ComReg

<sup>7</sup> Eircom Document – Duct Access: Industry Process Manual v1.2 – draft version from 21/04/2016 provided by ComReg

<sup>8</sup> Eircom Document – Pole Access: Product Description v1.2 – draft version from 21/04/2016 provided by ComReg

<sup>9</sup> Eircom Document – Pole Access: Industry Process Manual v1.2 – draft version from 21/04/2016 provided by ComReg

<sup>10</sup> Eircom Document – Submission to ComReg - ducts and poles s13D Final 03Mar16, provided by ComReg

<sup>11</sup> Eircom Document - Response to ComReg Information Requirement of 29th April 2016, from 20/05/2016, provided by ComReg

### 3. Regulated Wholesale Access Product Offering in Ireland

In this section, we describe the regulated wholesale access products for duct and pole infrastructure access offered by Eircom and identify potential areas for improvement.

Our assessment covers both the CEI products and the operational processes that support them. However, it should be noted that options for changing the scope of the CEI remedy are beyond the scope of this project.

The assessment of the products and processes starts with an overview of the key product/process features, which helps contextualise the potential issues identified.

#### 3.1 Duct Access Product Description

##### 3.1.1 Overview

The wholesale duct access product offered by Eircom allows OAOs to install their own fibre cabling using Eircom's access network infrastructure.

The duct access product has the following key features:

- Supports fixed broadband services only; cannot be used for leased lines, NGN Ethernet and other data services<sup>12</sup>
- Only available in the local access segment of the network
- OAO cables must be installed in per-operator sub-ducts
- Sub-duct routes are only offered between nominated network flexibility points:
  - From a chamber outside an Eircom exchange, or other suitable chamber, to chamber outside final distribution point (DP) outside the customer premises
  - From a chamber outside an Eircom exchange, or other suitable chamber, to chamber outside an Eircom cabinet
  - From a chamber outside an Eircom cabinet to chamber outside final DP at the customer premises
- The product is not available in cases where construction of new civil work is required
- For operational reasons Eircom does not accommodate OAOs' jointing, splicing or any associated equipment in their chambers

The product is offered with a set of SLAs. Target timescales for the fulfilment and assurance processes are shown in the table below<sup>13</sup>.

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<sup>12</sup> The restriction on non-broadband traffic (e.g. leased lines) does not apply to the delivery "of the Wholesale access services listed in Annex II of the EU Guidelines for the application of State aid rules in relation to the rapid deployment of broadband networks (2013/C 25/01) for any Operator within an area associated with a large scale major infrastructure project predominately intended to deliver fixed broadband services (for example NBP). If required as part of such a major infrastructure project then, specifically to support backhaul out into the associated major programme area the restrictions will be lifted on duct routes from the first point of active aggregation to the nearest POH of the Operator outside the associated major project area – point to point only, no breakout"

<sup>13</sup> Eircom Document – Duct Access: SLA v1.1 – draft version from 29/02/2016, provided by ComReg

**Figure 1. Duct Product SLAs and Timeline per process activity**

Process Activity		Performance Metric	Target (Working Days)
Pre-ordering	Desktop Survey	Acknowledgement receipt of request	2
		Provision of point-to-point route survey from date of acknowledgement	13
	Field Survey	Provision of point-to-point route survey from date of acknowledgement	13
	Sub-duct Design	Provision of new sub-duct design including rod, rope and test (RTT)	30
Ordering	Provisioning	Acknowledgement receipt of request	2
		Sub-duct installed (including test)*	40 *
	Duct reservation	Sub-duct is fully in-situ	10 *
		acknowledgement receipt of request	2
Fault Management	Acceptance/ rejection of fault report	Time to Response after fault receipt	1
	Target repair	Advise OAO of repair progress	2
Planned Access	Acknowledgement of request	Acknowledgement and validation or rejection of access form	< 1
	Provision of access	Appointment to be provided following a min. notice period	3

\* It may be longer if Eircom requires wayleave approval to remove blockages

The table below illustrates the three potential edge cases for an order fulfilment given the currently defined SLA timelines<sup>14</sup>.

<sup>14</sup> Eircom Document – Duct Access: SLA v1.1 – draft version from 29/02/2016, provided by ComReg

**Figure 2. Duct Product SLAs and Timeline per process activity**

Process Activity		SLA (Working Days)		
		Existing Sub-Duct + Desk Survey	Existing Sub-Duct + Field Survey	New Sub-Duct + Field Survey
PRE-ORDERING	Acknowledgement	2	2	2
	Desktop Survey	13	13	13
	Field Survey	-	13	13
	Sub-Duct Design	-	-	30
ORDERING	Acknowledgement	2	2	2
	Sub-Duct Connection	10	10	-
	Sub-Duct Installation	-	-	40
<b>MAXIMUM TIME WITHIN SLA</b>		<b>27</b>	<b>40</b>	<b>100</b>

Eircom provides product documentation describing the operational processes for fulfilment and assurance. There are two main documents, the Product Description<sup>15</sup> and the Industry Product Manual (IPM)<sup>16</sup>. These describe the pre-ordering, ordering, sub-duct reservation and maintenance activities for this product, as well as the supervised access requirements and the associated billing charges. The SLA times are described in a separate document, the Duct Access SLA<sup>17</sup>.

There are variations to some product features and processes for Major Infrastructure Programmes (MIP). Eircom considers a MIP to be one that contemplates roll-out in at least 10 exchange areas with the intention to pass at least 10,000 premises with a broadband capable service.

To handle MIP requests, a ring-fenced team is created within Eircom’s infrastructure access team. The changes affect two main stages of the fulfilment process: Plan and Implementation. The process differences are highlighted in the next section.

Following a change to the product in 2015, it is now possible for OAOs to reserve sub-duct space for a maximum of 12 months (extendable).

<sup>15</sup> Eircom Document – Duct Access: Product Description v1.2 – draft version from 21/04/2016 provided by ComReg

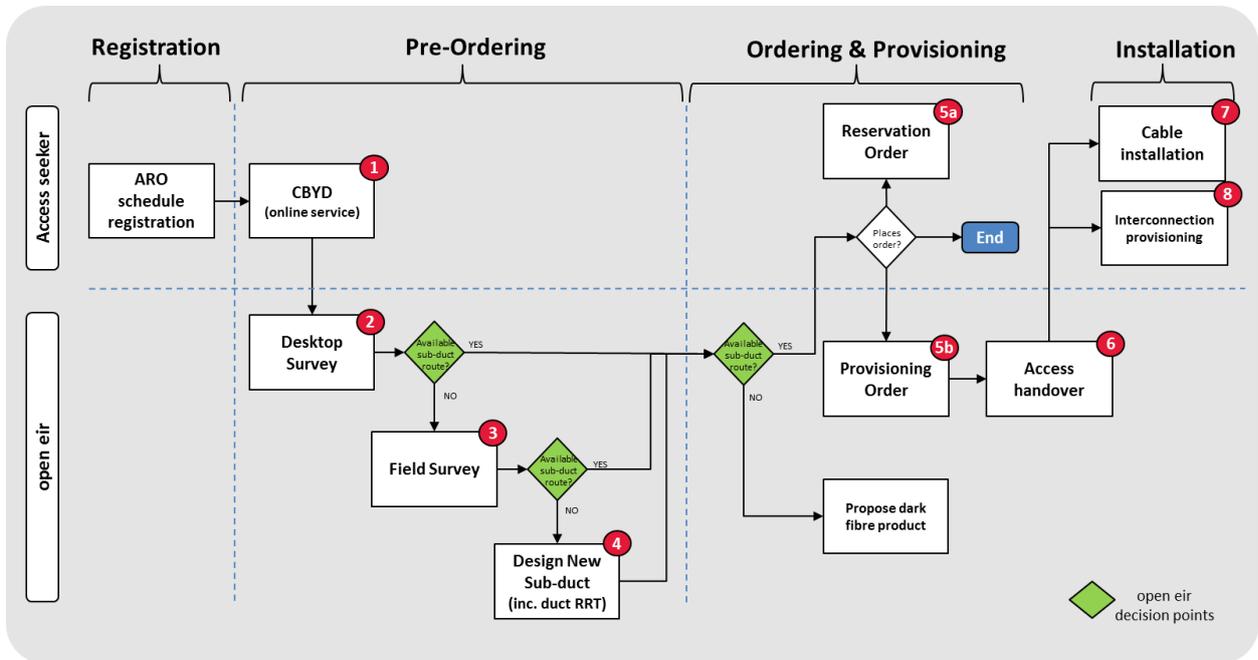
<sup>16</sup> Eircom Document – Duct Access: Industry Process Manual v1.2 – draft version from 21/04/2016 provided by ComReg

<sup>17</sup> Eircom Document – Duct Access: SLA v1.1 – draft version from 29/02/2016, provided by ComReg

3.1.2 Service Delivery Processes

We mapped the high-level operational fulfilment process based on information found in Eircom’s product documentation<sup>18 19</sup>. A flowchart of the process is illustrated in the figure below.

**Figure 3. Operational Fulfilment Process – High-level Activities**



Eircom structures its operational processes for the duct access product as follows.

**Pre-ordering Survey / Design:** In 2014, Eircom disaggregated the pre-ordering process and associated charges. This phase is now divided into three stages as shown below. The Survey/Design stages are mandatory steps in the fulfilment process. The order handling process is manual and all order requests are sent to the wholesale account manager via email.

1. Click-Before-You-Dig (CBYD)
  - i. The OAO can check Eircom’s current duct network (but not duct usage levels) before requesting access using this online service.
2. Desktop Survey (DS)
  - i. The OAO complete a survey request form with site location map and x-y coordinates of the proposed OAO chambers for the proposed route. A designer selects the most suitable chambers and checks the Excel record file for duct availability.
  - ii. There are two potential outcomes: a continuous sub-duct route between the OAO ingress and egress chambers is available, or there are data gaps on the requested route in which case a field survey, and maybe sub-duct design, is required.

<sup>18</sup> Eircom Document – Duct Reservation Process v0.3, 13/01/2016, provided by ComReg

<sup>19</sup> Eircom Document – Duct Survey-Design Process v0.10, 13/01/2016, provided by ComReg

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### 3. Field Survey (FS)

- i. If the OAO agrees to proceed with field survey, Eircom's technician visits site to find physical evidence to establish the requested route.
- ii. Following the field survey, if a continuous sub-duct route is available, the designer issues a drawing with the route and relevant connection and annual licence charges. If not, the OAOs are advised that a new design/build is needed, which includes the RRT activity.

### 4. Sub-duct Design (SD)

- i. The sub-duct design stage only takes place if the desktop and/or field surveys are inconclusive.
- ii. If the OAO agrees to proceed to this stage, Eircom will use the information gathered during the previous stages to prepare the designs and conduct the RRT.
- iii. If route is possible, the designer issues a route drawing and relevant installation and annual licence charges.

**Ordering / Provisioning:** Depending on the outcome of the previous stages there are three different types of order that the OAO can submit: sub-duct provisioning; sub-duct reservation; and, dark fibre provisioning. Additionally, the OAO can submit an exit order to cease the duct access product provisioning.

#### 5A. Provisioning order

- i. OAO signs a duct access licence and completes the order form (appendix B IPM).
- ii. Eircom hands over the duct access to OAO; sub-duct can be already fully *in situ* or is installed according to the sub-duct design; different SLA timelines apply.

#### 5B. Reservation order

- i. OAO completes order form (IPM appendix G) for reserving sub-duct space in the proposed duct route after survey completion and before placing an order for duct access. Reserved sub-duct access is available for a maximum period of 12 months.
- ii. Reservations are taken into account when assessing any subsequent request for duct access.

#### 5C. Dark Fibre order

- i. If sub-duct space is not available on the proposed route, the OAO can place an order for dark fibre.
- ii. Eircom checks if dark fibre is available in their fibre information systems and designs a solution to discuss with the OAO; the OAO must extend its fibre to a meet-me chamber via a sub-duct.

#### 5D. Exit Order (not represented in the figure above)

- i. OAO needs to place an exit order for removing the cable from the sub-duct.

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The requests for MIPs follow a slightly different fulfilment process

- i. There are two main stages: plan and implementation. Duct information (not including usage) is provided upfront to OAOs for designing their fibre network and submitting the high-level design (HLD), and Eircom just validates, i.e., the desktop survey and designs are performed by the OAO rather than Eircom.
- ii. A field survey is conducted (by Eircom) after the HLD is submitted to establish the actual duct space availability. The OAO will finalise the detailed designs and plans, which will be agreed jointly by the OAO and Eircom during the project management stage.

### 3.1.3 Service Assurance Processes

The assurance processes define the responsibilities of Eircom and OAOs in handling and repairing faults in the duct and sub-duct infrastructure and in the cables. They also cover the planned and unplanned maintenance activities conducted by both parties.

- Fault handling, repair / replacement

Currently, Eircom is responsible for the maintenance of the sub-ducts in their network while OAOs are responsible for the maintenance and repair of sub-ducts outside the Eircom network. For example, the OAOs are responsible from break-in and break-out points at the Eircom ingress/egress chambers, and for their own cabling.

- Planned & unplanned maintenance

These activities are conducted both by Eircom or the OAOs. For planned maintenance, Eircom is required to notify OAOs giving a minimum of 10 days' notice before any work commences. OAOs are also required to inform Eircom of any activity they are conducting on their own cabling.

## 3.2 Duct Access Product Assessment

### 3.2.1 Product-related factors

We identified several product-related factors which present opportunities for potential processes and / or system changes. These are listed below.

- 1. Eircom is responsible for determining the chambers to be used and routes must follow Eircom's tree-and-branch topology which may not be well-suited to the OAO's own network design.**

A concern regarding constraints in choice of ingress/egress points has been raised previously by OAOs. In 2014, Eircom set out the reasons<sup>20</sup> for refusing access at ingress/egress points other than those chambers at the exchange (E) or at the final distribution (DP) with the following justification: "It is not technically feasible to consider access to breach the sub-duct between an Eircom exchange and a cabinet as the sub-duct is multicore sub-duct carrying other services - ingress/egress would require cutting into multicore sub-duct along a route which raises engineering risk and technical difficulties."

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<sup>20</sup> Eircom Document – Appendix 1– eircom Ingress-Egress point reply to Industry 220914, from 22/09/2014, provided by ComReg

## Cartesian: CEI Service Delivery Process Equivalence Options

Following discussions with industry, Eircom appears to have relaxed its rules regarding ingress/egress points. In its statement of compliance relating to the duct access product<sup>21</sup>, Eircom states that it will now determine the most suitable ingress/egress point which is closest to the OAO's requested ingress/egress point. We note, however, that Eircom retains a degree of discretion in the selection of chambers.

Providing access to intermediate Eircom chambers would provide greater flexibility to OAOs. Whilst cutting into a multicore sub-duct would raise the level of risk, it is not clear that this is an insurmountable technical challenge. Cartesian spoke with one UK-based civil engineering contractor that confirmed that cutting and jointing of sub-ducts was sometimes necessary. In situations where the sub-duct is freshly installed, without any fibre cables present, there would be no specific risk. Also, if an OAO was the only occupant of a sub-duct, then the risk would be to its own services.

### **2. Eircom mandates that OAO access to its ducts must be supervised which adds additional time and cost in service delivery and assurance.**

This is the case even if the OAOs use the same contractors as Eircom. [X]. Furthermore, OAO staff or sub-contractors are accredited by Eircom for cable installation purposes, this could be extended to allow access to Eircom's infrastructure without supervision. This would reduce delivery times and costs.

While Eircom is rightly concerned to protect its infrastructure from potential damage, civil responsibility insurances could cover for any potential network issues caused by an OAO.

### **3. The SLAs offered by Eircom place a high level business risk on the OAOs, with long lead times and significant coverage gaps.**

The current SLAs do not cover all aspects of the fulfilment and assurance processes; there are significant gaps in the assurance activities for example there is no defined SLA for major fault incidents (fault management) and there are no SLAs defining the maximum repair time. Also, the minor fault category is broad, for example the impact of a fault affecting a residential block is significantly different from one affecting an entire commercial block.

There are no defined SLAs for survey and design requests at the pre-ordering stage, when more than one point-to-point route or point-to-multi-point route order is requested within same exchange/cabinet area. This is said to be treated as a project with timelines agreed with the OAO, but without defined SLAs at the start an OAO is less likely to initiate a project.

In addition, there is no SLA for emergency Clerk of Works requests during OAO cable installation. The permitted lead times for certain activities appear to be excessive, for example taking up to 2 working days to acknowledge the receipt of an order request, and no SLA penalties are defined in the published documentation; OAOs do not know what Eircom's responsibilities are if something goes wrong during their own work.

### **4. No KPIs for service delivery or service assurance are defined or published.**

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<sup>21</sup> Eircom's Wholesale Physical Network Infrastructure (WPNIA) Compliance Framework for Duct Access product from 18/11/2014 – Provided by ComReg

## Cartesian: CEI Service Delivery Process Equivalence Options

Publication of KPIs would enable ComReg and the industry to monitor the operational performance of Eircom in delivering and assuring the product. The lack of published KPIs also makes it difficult to monitor whether OAOs are being treated equivalently to Eircom's internal downstream businesses, for example in the time taken to conduct surveys.

### 5. The published product-related documentation lacks detail and comprehensiveness.

The available documentation only offers a very high-level description of the product offering and the fulfilment and assurance processes. A few examples below:

- i. Dark fibre is offered as an alternative for sub-duct unavailability but the fulfilment process description is described only at very high level (a couple of bullet points) in an appendix of a technical document (IPM)<sup>22</sup>.
- ii. Eircom says that "duct availability will be managed by Eircom in accordance with Eircom's network engineering rules" but do not described the engineering rules in any of the published documents. In contrast, in Portugal, there are dedicated appendices describing in detail how duct availability is calculated and setting a percent of free space for maintenance purposes.
- iii. Eircom says that "Operators' staff or their sub-contractor staff must be accredited by Eircom and work must be carried out to Eircom's standards" but without specifying which accreditations or describing the standards in any of the published documents.

There is a significant overlap in content between the Product Description and the Industry Process Manual (IPM) documents.

There is also a significant lack of transparency in the documentation. For instance, the published documentation doesn't include a defined price list nor a list of KPIs, contrasting to practices observed in other countries (e.g., Portugal and France).

#### 3.2.1 Operational factors

We identified several operational factors which present opportunities for potential processes and / or system changes. These are listed below against each stage of the main operational processes.

#### Pre-ordering Stages of the Fulfilment Process

##### 1. **Insufficient information is made available to OAOs to enable them to conduct their own desk survey.**

Eircom does not make duct route and usage information available for OAOs on a self-service basis. An online tool that provided localised maps of the duct infrastructure and detailed information about location, profiles of duct and chambers and usage levels would provide greater control to OAOs and enable them to more easily explore the potential feasibility of duct access.

Although there is some duct information in the 'Click-Before-You-Dig' (CBYD) tool, this has been developed to support construction activities (to avoid damage to infrastructure) and is not intended to be a planning tool.

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<sup>22</sup> Eircom Document – Duct Access: Industry Process Manual v1.2 – draft version from 21/04/2016 provided by ComReg

### **2. Eircom's reliance on MS Excel spreadsheets to record duct usage may lead to data integrity issues.**

While the process diagrams mention the existence of these Excel files, it is not clear exactly what information is captured. Reliance on spreadsheets can be risky and it is important to have strict data governance rules in place. Eircom does not provide upfront duct infrastructure information, including usage, in a transparent and accessible way which would be of value to OAOs looking to use the CEI product.

### **3. There is a lack of transparency regarding the duct information used in the desktop survey.**

The Desktop Survey determines if a sub-duct route is available. It is mandatory for small requests and is conducted by Eircom. However, for future MIPs – such as the National Broadband Plan (NBP) – Eircom has adapted the process for providing upfront duct information (not including usage data) to allow the OAOs to conduct the survey themselves and prepare the network design and planning. It is unclear why this information is not made available independently of the size of the request.

It is also unclear how Eircom captures the duct usage data and keeps it up to date. The data sources are not defined and it's unclear if the same information is used for both internal and external customers.

In addition, the allowed response time seems excessive given the simplicity of the task (13 working days) versus the task duration (less than two hours as estimated by Eircom). Reasons and evidence which make a field survey necessary do not appear to be shared with OAO nor documented for further improvement.

### **4. There is a lack of transparency regarding the information obtained during the field survey and some open questions on record keeping.**

The field survey aims to address any gaps in the desktop survey. However, it is not clear what tasks are carried out by the technician during the field survey. The procedure is not documented in any of the published documents. As well as documenting the procedures, the evidence captured during the field survey should be captured, stored and shared with the OAO whether a viable route is found or not.

### **5. There is a lack of clarity regarding the role of the Access Fibre database in recording duct usage information.**

The Access Fibre database is mentioned in the process diagrams but is not defined anywhere in the rest of the documents. It is not clear if the result of the RRT is updated in the database in order to keep gradually improving the duct usage information.

### **6. The pre-ordering stage potentially involves multiple site visits, which increases the overall provisioning timescales.**

If needed, the RRT is organised as a separate site visit following the field survey. If possible, it would be more efficient to align this with other field activities to avoid multiple field interventions, authorisation requests and potentially some sort of public disruption.

## **Ordering Stage of the Fulfilment Process**

### **7. OAO sub-duct information is not stored in the inventory system.**

## Cartesian: CEI Service Delivery Process Equivalence Options

Information for self-supply orders (i.e. internal customers), [X]. However, this does not appear to apply for the OAO requests according to the published documentation from Eircom. This may create a differentiated treatment when it comes to calculate the available duct usage information. It also makes it more difficult to maintain and share duct usage information with the industry.

### **8. The supply of sub-duct in the interconnection duct is Eircom's responsibility even though it falls beyond the defined demarcation point.**

It is unclear why the OAO cannot independently source the sub-duct to Eircom's specification.

### **9. The documentation that the OAO is required to send after completion of the preparation work for the installation of the interconnection sub-duct is not clearly defined.**

The OAO must submit documentation to Eircom after completion of the preparatory work to request supervised access for installation. Note that Eircom will only supply the sub-duct after acceptance of this documentation.

## **Assurance**

Assurance is one of the biggest areas of concern. The processes are vaguely described in the published documentation and the SLAs are limited. This places a high degree of business risk on the OAOs and reduces their confidence that if issues arise, they will be solved quickly and effectively by Eircom.

We identified the following key concerns:

### **10. The repair of a damaged sub-duct does not start until the OAOs remove their fibre cables from the contracted sub-duct.**

Requiring the complete removal and reinstatement of the cable can be expected to take considerable time during which the OAO's end customers would have no service. Delays may be compounded if several sub-ducts are damaged at the same time and more than one OAO needs to attend to remove its cables.

Depending on the situation, a single cable may be serving hundreds of premises and/or business critical services. Loss of service for an extended period of time would be damaging to the OAO's reputation and business.

### **11. A faulty OAO cable must be replaced in full. Access is not provided to intermediate chambers to enable re-splicing or re-routing around a damaged duct.**

This is quite restrictive leading to longer repairing times and increased repairing costs. This point is related to the concerns highlighted under the product assessment on the number of nominated ingress/egress chambers.

### **12. The definitions for major and minor faults are too broad.**

A major fault is one with public safety risks. All the others are considered minor faults. However, different levels of faults and resolution priorities are required to address the different OAO requirements and service level commitments to their end customers. Existing SLAs do not include maximum resolution times, and a proactive notification process for major faults isn't defined or documented.

### **13. Eircom does not provide a robust operational interface for reporting and managing faults.**

## Cartesian: CEI Service Delivery Process Equivalence Options

The Wholesale Manager is currently the single point of contact for account, commercial and technical requests. Relying on the Wholesale Manager for operational incidents does not appear to be robust and is unlikely to provide 24x7 coverage. This is likely to negatively impact the time to respond to a fault and restore service.

Instead, it would be better to provide a direct point of contact to a service assurance team which would be responsible for acting on the fault report. This cuts out the need for the Wholesale Manager, which in this situation is an unnecessary middle man.

### 3.3 Pole Access Product Description

#### 3.3.1 Overview

The wholesale pole access product provided by Eircom allows OAOs to offer fixed broadband services to their end customers via Eircom's aerial routes. OAOs install their access cables along Eircom's pole access network between nominated ingress and egress locations. OAOs are responsible for providing connectivity from their network to the nominated Eircom's pole locations.

The pole access product has particular relevance in Ireland given the extent of Eircom's pole network, especially in rural areas.

The current product offering consists of the following features<sup>23 24 25</sup>:

- Supports fixed broadband services only; cannot be used for leased lines, NGN Ethernet and other data services<sup>26</sup> (similar to the duct product)
- Allows OAOs to use the same access network that is used to deliver the local access element (WPNIA) of Eircom copper and fibre next generation access wholesale broadband services (similar to the duct product)
- Permits aggregation of fixed broadband traffic; however, traffic from leased lines, NGN Ethernet and other data products is excluded (similar to the duct product)
- Not available in cases where construction of new civil work is required (similar to the duct product)
- The nominated ingress and egress pole locations (within an Eircom exchange or cabinet area) are points on Eircom's network nearest to the OAO requested access points, and provide connectivity:
  - From the first suitable pole at the start of the aerial route to the distribution point/pole which distributes the lead-in cable to customers' premises
  - At a pole at the final distribution point of the lead-in cable to the customer's premises, where the infrastructure is underground to this point
  - At a pole where the OAO's cable transfers to an alternative non Eircom network facility
- OAOs have two options to interconnect to the first suitable pole on an aerial route:

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<sup>23</sup> Eircom Document – Pole Access: Product Description v1.2 – draft version from 21/04/2016 provided by ComReg

<sup>24</sup> Eircom Document – Pole Access: Industry Process Manual v1.2 – draft version from 21/04/2016 provided by ComReg

<sup>25</sup> Eircom Document – Pole Access: Technical & Operational Manual v1.0 – draft version from 10/08/2015, available on Eircom website

<sup>26</sup> The restriction on non-broadband traffic (e.g. leased lines) does not apply to the delivery "of the Wholesale access services listed in Annex II of the EU Guidelines for the application of State aid rules in relation to the rapid deployment of broadband networks (2013/C 25/01) for any Operator within an area associated with a large scale major infrastructure project predominately intended to deliver fixed broadband services (for example NBP). If required as part of such a major infrastructure project then, specifically to support backhaul out into the associated major programme area the restrictions will be lifted on duct routes from the first point of active aggregation to the nearest POH of the Operator outside the associated major project area – point to point only, no breakout"

## Cartesian: CEI Service Delivery Process Equivalence Options

- By a sub-duct if interconnecting via Eircom’s chamber next to the pole; in this case OAOs need to provide a duct from their chamber to the chamber at the base of Eircom’s pole
- Overhead drop from OAO’s pole network
- For operational reasons Eircom does not accommodate OAOs’ jointing, splicing or any associated equipment in their chambers
- Pole availability managed by Eircom in accordance to their network engineering rules
- OAOs are not required to have an Eircom Clerk of Works on site when installing their cable on the Eircom’s pole or aerial route
- The product allows OAO to reserve space on the proposed pole route ahead of placing an order for pole access (following the survey and design plan stages)<sup>27</sup>
- Eircom is responsible for the maintenance of distribution and aerial route poles and the OAOs are responsible for repair, maintenance and replacement of their fibre and associated equipment on Eircom poles and aerial routes
- Some product features and processes are adjusted to address the requirements of a MIP – similar to the duct product
  - Eircom considers a MIP to be one that contemplates roll-out in at least 10 exchange areas with the intention to pass at least 10,000 premises with a broadband capable service
  - A ring-fenced team was created for handling the MIP requests. This team is part of Eircom’s infrastructure access team, dedicated for the national broadband plan programme
  - There are two main stages: Plan and Implementation. The process differences are highlighted in the next section
- The product offered with a set of SLAs. Timelines are defined for some activities of the fulfilment and assurance processes as shown in the following table<sup>28</sup>.

**Figure 4. Pole Product SLAs and Timelines per Process Activity**

Process Activity		Performance Metric	Target (Working Days)
Pre-ordering	Pole Network Design	Acknowledgement receipt of OAO survey	2
		Provision of a pole route design plan from acknowledgement of a ‘single route’ request	30
Ordering	Route Preparation	Acknowledgement receipt of order request	2
		Pole route preparation completed	40*
	Pole furniture Order	Acknowledgement receipt of order request	2
		Request for pole furniture reviewed and completed	10

<sup>27</sup> An Operator cannot reserve space on Eircom poles if for a publicly funded competitive bid. Third parties such as local authorities or government departments may provide public funds to facilitate the deployment of broadband. These funds are usually allocated on the basis of a published competitive tender. In these situations, it is important to ensure that space (especially where this is limited) is allocated to the winning bidder and not all Operators participating in the bidding process.

<sup>28</sup> Eircom Document – Pole Access: SLA v1.1 – draft version from 29/02/2016, available on Eircom website

## Cartesian: CEI Service Delivery Process Equivalence Options

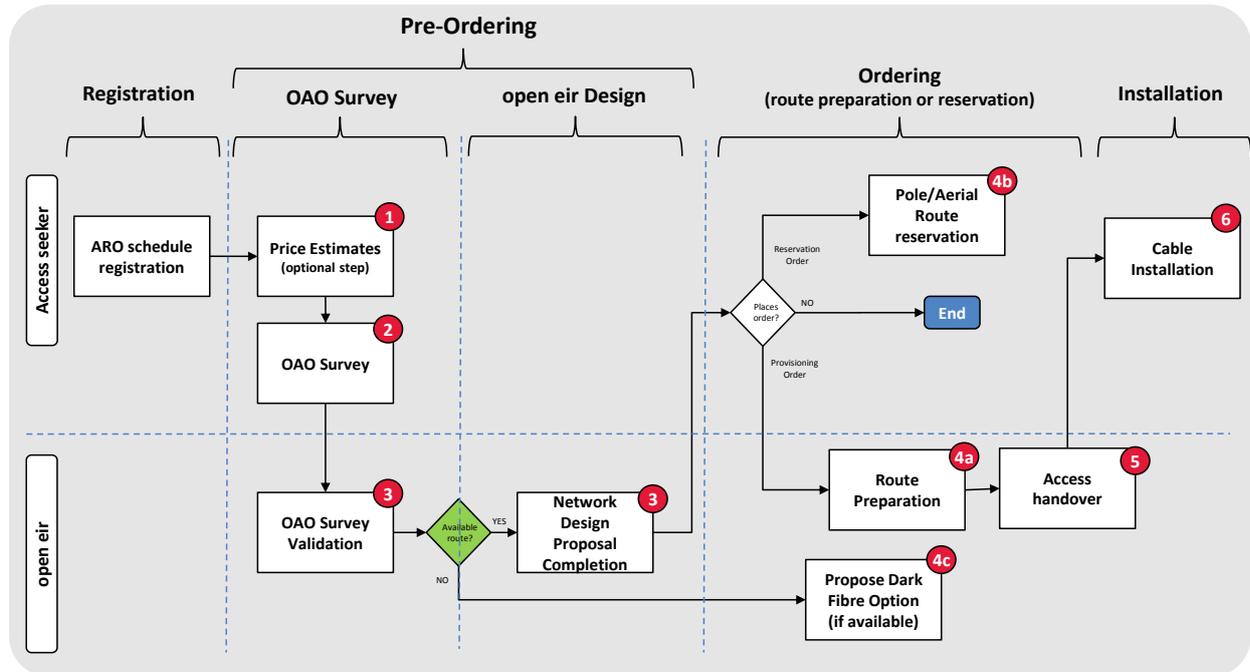
Process Activity		Performance Metric	Target (Working Days)
Reservation		Acknowledgement receipt of order request	2
		Completion of request for reservation for a single route order	10
Fault Management	Acceptance/rejection of fault report	Time to Response after fault receipt	1
	Target Repair	Advise OAO of repair progress	2
Planned Access	Ack. of request	Acknowledgement and validation or rejection of access form	<1
	Provision of access	Appointment to be provided following a minimum notice period	3

\* It may be longer if Eircom requires wayleave approval to remove blockages

3.3.2 Service Delivery Processes

We mapped the high-level operational fulfilment process based on information found in Eircom’s product documentation<sup>29 30 31</sup>, as illustrated in the figure below.

**Figure 5. Operational Fulfilment Process – High-Level Activities**



<sup>29</sup> Eircom Document – MIP Pole Inventory Information v5, 30/03/2016, draft, provided by ComReg

<sup>30</sup> Eircom Document – MIP Pole Design Build v0.3, 30/03/2016, draft, provided by ComReg

<sup>31</sup> Eircom Document – MIP Pole Inventory Information v5, 30/03/2016, draft, provided by ComReg

## Cartesian: CEI Service Delivery Process Equivalence Options

Eircom structures the operational processes for its pole access product as follows.

### Pre-ordering Survey / Design:

1. **Price Estimates** – Eircom provides OAOs with an estimate of the cost for pole access along a particular route before starting the survey. There are two options for the OAO: (1) desktop estimate (before OAO survey); and (2) desktop estimate based on OAO survey (no design/plan work done)
2. **OAO Survey** – an initial physical survey design of the requested route which includes a visual inspection
  - i. The OAO requests pole inventory information to conduct the survey, which includes field inspection. The OAO sends pole survey design submission form (IPM appendix A) for Eircom’s validation and design phase
3. **Eircom Design** – Eircom reviews the OAO survey design, approves/designs the aerial route and /or poles for the OAO. It also provides OAO with the associated price quote. OAO acceptance of Eircom’s plans and price quotation is required for a provisioning or reservation order to be placed.

**Ordering:** Depending on the outcome of the previous stages there are three different types of order that the OAO can submit: a) OAO places an order to get access to the proposed pole route, b) the OAO decides to reserve pole space for the proposed route before placing an order for pole access, and c) pole space is not available on the proposed route and the OAO places an order for dark fibre. Additionally, the OAO can submit an exit order to cease a pole access product provisioning.

#### 4A. Pole Provisioning order

- i. In response to the provisioning order, Eircom prepares the pole route for the cable installation by the OAO, such as strengthening, re-arrangement of existing cables, replacement of dangerous poles and any other tasks which are required to ensure the aerial route or pole is fit for purpose (note that tree trimming and pole testing are not part of this activity)

#### 4B. Pole Reservation order

- i. OAO completes order form (IPM appendix G) for reserving pole space in the proposed pole route after survey completion and before placing an order for pole access. Reserved pole access is available for a maximum period of 12 months.
- ii. Reservations are taken into account when assessing any subsequent request for pole access.

#### 4C. Dark Fibre order

- i. If pole space is not available on the proposed route, the OAO can place an order for dark fibre
- ii. Eircom checks if dark fibre is available in their fibre information systems and designs a solution to discuss with the OAO; OAO to extend their fibre to a meet-me chamber via sub-duct

## Cartesian: CEI Service Delivery Process Equivalence Options

5. Exit Order
  - i. OAO needs to place an exit order for removing the cable from the pole.
6. Major infrastructure Programmes – similar to the duct product
  - i. There are two main stages: plan and implementation. The requests for MIP follow a slightly different fulfilment process. For small requests, the Operator is responsible for the following: OAO Route Survey design, installing their aerial cable, fibre splicing and maintenance and repair of the fibre and lead-in cables. All work carried out to Eircom CPI specifications. However, in MIP, OAOs develop their network planning and submit the high-level design (HLD); Eircom just validates the initial design and provide pricing, i.e., network designs are performed by the OAO rather than Eircom.
  - ii. The aerial route is surveyed by the OAO after the HLD is submitted to establish the viability of the proposed route. OAO will finalised the detailed designs and plans, which will be agreed jointly by the OAO and Eircom during the project management stage.

### 3.3.3 Service Assurance Processes

The assurance processes define the responsibilities of Eircom and OAOs in handling and repairing faults in the duct and sub-duct infrastructure and the cables. They also cover the process followed in case of planned and unplanned maintenance activities. The assurance processes are similar to the duct product.

- Fault Management (handling, repair / replacement)

Eircom is responsible for the maintenance of the distribution and aerial route poles, while OAOs are responsible for the repair, maintenance and replacement of their fibre and their associated equipment on Eircom poles and aerial routes. Major faults are defined as cases like broken poles or dangerous hanging poles with risk to public safety, while minor faults are everything else.

- Planned & unplanned Maintenance

These activities are conducted both by Eircom or the OAOs. Eircom notifies OAOs giving a minimum of 10 days' notice of any work commencing. OAOs must inform Eircom of any activity on OAO's cabling.

## 3.4 Pole Access Product Assessment

### 3.4.1 Product-related factors

We identified several product-related factors which present opportunities for potential processes and / or system changes. These are listed below.

- 1. Any access to Eircom duct or chamber (at first suitable pole) for cable installation is subjected to supervised access from Eircom.**

This reduces delivery times and increases costs unnecessarily. The SLAs associated with this can be improved with shortened times.

### **2. There is some inconsistency regarding the responsibilities / demarcation between Eircom and the OAOs.**

The route preparation is Eircom's responsibility but tree trimming and pole testing are the OAO's responsibility. The responsibility for requesting the consent from local authorities and private landlords changes with no apparent reason. For example, consent for fault management (of poles and/or cables) and route preparation (e.g., replacing poles) is Eircom's responsibility. However, for the survey, cable installation and tree trimming, if the pole is on private property, it is the OAO's responsibility to request and get consent from the land owner. It is not clear if it is the OAO responsibility as well if the pole is on public property.

### **3. The SLAs offered by Eircom places a high level business risk on the OAOs, with long lead times and significant coverage gaps**

The time for acknowledging the receipt of an order or the time to notify/update OAOs on a major fault appears to be excessive. It should be possible to provide simple acknowledgements within 2 hours.

The definition of minor faults is also too broad – for example “All other pole faults are considered minor faults. Operator reports the fault to the Eircom Account Manager”. Multiple orders are treated as a project and timelines agreed with the operator on a case by case basis, which may lead to lower initial uptake as there are not guaranteed standards of service from the beginning.

### **4. No KPIs for service delivery or service assurance are defined or published**

These are critical to monitor the performance of the product offering and increase process transparency.

### **5. The published product-related documentation lacks detail and comprehensiveness**

The documentation offers a very high-level description of the product offering and the fulfilment and assurances processes. A few examples below:

- Fault criteria is not defined – e.g., “It is a mandatory obligation for an Operator to prove any fault from within their own network before logging a fault with Eircom. Any fault not found within the Eircom network will be classified as a non-fault. A chargeable form will be provided to cover Eircom costs incurred dealing with non-faults.”
- Accreditations are required but not specified – “All personnel who wish to access and work on Eircom network infrastructure must be suitably trained and accredited in the work that they are performing”.
- Major and minor fault definitions are too vague – e.g., “A major fault is a serious Health & Safety issue which warrants escalating via the Eircom Dangerous Plant processes”.
- Engineering rules are referred to but not published – e.g., “Pole availability will be managed by Eircom in accordance with Eircom's network engineering rules, regardless of which Operator requests it”; or they are buried in the middle of process documentation rather than in a technical procedure document – e.g., “It should be noted that a drop wire is subject to a maximum of 4 spans, one of which is the final lead-in to the premises”.

## Cartesian: CEI Service Delivery Process Equivalence Options

In addition, the documentation doesn't include any KPIs for SLA monitoring nor a list of pricing for the different services.

### 3.4.2 Operational factors

We identified several operational factors which present opportunities for potential processes and / or system changes. These are listed below against each stage of the main operational processes.

#### **Fulfilment Process**

**1. Price Estimate Service is based on limited information and may be inaccurate.**

The desktop estimate provided by Eircom is based on limited information. There is no fixed price schedule, and thus the final cost may be subject to significant change.

#### OAo Survey

**2. Limited information on poles is available for OAos to assess the potential of a route through desk surveys.**

The pole inventory information does not contain pole usage information. Eircom informed us that there are no accurate records of aerial route or pole availability in Eircom's databases. Obtaining this information is the main purpose for the OAo survey.

In addition, current pole inventory information is not shared upfront to OAos, except in the case of MIPs. Pole inventory information consists of just pole x-y coordinates and pole barcode/ID and must be requested by the OAos – which is not the case for MIP requests. This introduces unnecessary latency to the process.

Furthermore, aerial routes are recorded in the inventory system, but pole location and information is not. Data is collected separately (via the pole testing initiative) and stored in a built-for-purpose database, the exact nature of which is not specified. We don't find any technical reason why this information isn't stored in the inventory system.

**3. Eircom doesn't guarantee the accuracy of the data about aerial routes or pole availability**

It is unclear if Eircom uses the detailed information from the OAo survey to gradually improve pole usage information.

#### Eircom Design phase

**4. The product documentation does not explain what Eircom does to validate the OAo survey request.**

By outlining the processes used to validate the OAo survey, such as which information it uses and what the pass/fail criteria are, Eircom can improve transparency in its systems and processes.

**5. The product documentation does not explain what activities are undertaken in the network design stage.**

## Cartesian: CEI Service Delivery Process Equivalence Options

These activities are not defined in the detailed product documentation. Most of the work and information is conducted and gathered by the OAO during the survey phase. Eircom defines a 30 working day period to prepare the network design, though this could be much quicker and be simply a validation step before granting access to the OAO. In MIPs, OAOs prepare the high level design and Eircom validates it. We did not find any technical reasons for not allowing this for smaller requests also.

### Ordering

**6. OAO to carry tree trimming and pole testing which are not part of the route preparation conducted and charged by Eircom.**

It's not clear why there is a division of responsibilities for activities in this stage. The need to send two sets of contractors to site appears inefficient.

**7. It is unclear whether the network changes carried out as part of the route preparation and installation activities are recorded after field work is completed.**

This information can be used to start building a more accurate view of the state of the pole infrastructure and enhance the current pole inventory database beyond x-y coordinates.

According to the pole fulfilment process diagrams in Eircom's documentation, it appears that the inventory is updated with the aerial routes design after cable and pole furniture installation by the Eircom designer. However, this is inconsistent with information elsewhere in the documentation which states that no usage and cable information is stored.

**8. If route preparation activities are not completed by Eircom's build teams for unexpected reasons, the order is cancelled.**

It would be helpful to have some illustrative cases defined upfront, as this is currently vague. The rationale for cancelling an order should be provided in writing to the OAO for complete transparency. It may be appropriate for the OAO to have some means of redress.

### **Assurance**

There are concerns with the fault management processes. These concerns are similar to the ones identified for the duct access product and processes.

We identified the following key concerns:

**9. The repair of a damaged pole may not start until the OAO removes their cabling and/or equipment.**

When the aerial route or poles require maintenance, planned or unplanned, Eircom can request that the operator removes cabling or equipment from Eircom's infrastructure. This is not always necessary and can add additional latency to the process.

**10. Cable repairing/replacing is conducted by the OAO during planned/unplanned maintenance but any cable splicing work needs additional permission to be granted by Eircom.**

The OAO staff are already accredited to carry cable installation work in the poles following defined procedures. Requiring additional permission will delay the lead times.

### **11. The definitions for major and minor faults are too broad.**

A major fault is one with public safety risks. All the others are considered minor faults. However, different levels of faults and resolution priorities are required to address the different OAO requirements and service level commitments to their end customers. Existing SLAs do not include maximum resolution times, and a proactive notification process for major faults isn't defined or documented.

### **12. Eircom does not provide a robust operational interface for reporting and managing faults.**

The Wholesale Manager is currently the single point of contact for account, commercial and technical requests. Relying on the Wholesale Manager for operational incidents does not appear to be robust and is unlikely to provide 24x7 coverage. This is likely to negatively impact the time to respond to a fault and restore service.

Instead, it would be better to provide a direct point of contact to a service assurance team, which would be responsible for acting on the fault report. This cuts out the need for the Wholesale Manager, which in this situation is an unnecessary middle man.

## 4. Insights from Other Countries

To help identify alternative approaches to delivering CEI products, we developed case studies for three European countries: Portugal, France and the UK.

The table below compares aspects of the CEI products in the three countries with those in Ireland. The case studies are presented in full in Appendix 8.2 along with references to the source information.

**Figure 6. International Country Case Studies – Summary of Key Findings**

	Ireland	Portugal	France	UK
<b>Desk Survey</b>	<ul style="list-style-type: none"> <li>Conducted by infrastructure owner</li> <li>For MIP requests SMP operator provides upfront duct information to allow OAOs to conduct surveys</li> </ul>	<ul style="list-style-type: none"> <li>Conducted by OAO</li> <li>Comprehensive database covering technical specifications and available capacity / usage</li> </ul>	<ul style="list-style-type: none"> <li>Conducted by OAO</li> <li>Documentation provided for a fee on a municipality basis including route maps and available capacity</li> </ul>	<ul style="list-style-type: none"> <li>Conducted by OAO</li> <li>Documentation provided for a fee, including route maps and technical specifications but not availability</li> </ul>
<b>Field Survey</b>	<ul style="list-style-type: none"> <li>Conducted by SMP operator</li> </ul>	<ul style="list-style-type: none"> <li>Applicable when duct occupancy levels are high; conducted by SMP operator (same response time)</li> </ul>	<ul style="list-style-type: none"> <li>Conducted by OAO</li> </ul>	<ul style="list-style-type: none"> <li>Conducted by OAO</li> </ul>
<b>Implementation</b>	<ul style="list-style-type: none"> <li>SMP operator determines the eligible ingress/egress chambers; partial routes not allowed</li> <li>Cable installed only in sub-ducts, and only one operator per sub-duct</li> <li>SMP operator installs the sub-duct</li> <li>OAO responsible for installing the cable</li> </ul>	<ul style="list-style-type: none"> <li>No restrictions on routes / topology</li> <li>Almost all chambers are eligible for ingress/egress</li> <li>Cable installed directly into the duct or shared sub-ducts (dedicated sub-duct required to access exchange co-lo space)</li> <li>OAO responsible for installing the cable</li> <li>Joint boxes and spare cable may also be installed in chambers</li> </ul>	<ul style="list-style-type: none"> <li>No restrictions on routes / topology</li> <li>No restrictions on ingress/egress points</li> <li>Cable can be either installed in a sub-duct or directly into the duct</li> <li>SMP operator installs the sub-duct</li> <li>Operator installs the cable</li> <li>“Principle of non-saturation”</li> </ul>	<ul style="list-style-type: none"> <li>No restrictions on routes / topology</li> <li>No restrictions on ingress/egress points</li> <li>Cable must be installed in a sub-duct, directly in duct only in limited and exceptional circumstances</li> <li>OAO responsible for installing the sub-duct and cable</li> </ul>
<b>Available Capacity</b>	<ul style="list-style-type: none"> <li>Product only available where capacity is available</li> <li>Dark fibre offered if no available duct capacity</li> </ul>	<ul style="list-style-type: none"> <li>Blockage clearance by SMP operator</li> <li>Provision of alternative route if requested</li> <li>OAO removes its redundant cables</li> </ul>	<ul style="list-style-type: none"> <li>Regrouping of cables by SMP operator</li> <li>OAO required to remove its redundant cables</li> </ul>	<ul style="list-style-type: none"> <li>Possibility of building new ducts</li> <li>SMP operator to remove its redundant cables</li> </ul>
<b>Assurance</b>	<ul style="list-style-type: none"> <li>OAO responsible for fault handling on their cables but this cannot be done in situ</li> <li>OAO must remove any cables in order for SMP operator to repair ducts</li> </ul>	<ul style="list-style-type: none"> <li>SLAs for response times, not for duct repair</li> <li>Cables repaired by operator</li> <li>Duct repairs conducted by SMP operator</li> </ul>	<ul style="list-style-type: none"> <li>SLAs for response times, none for duct repair</li> <li>Duct damage must be proven by OAO</li> <li>Repairs conducted by SMP operator</li> </ul>	<ul style="list-style-type: none"> <li>SLAs for information provision</li> <li>Duct unblocking and repair done by SMP operator at cost oriented prices to operators</li> </ul>

## Cartesian: CEI Service Delivery Process Equivalence Options

	Ireland	Portugal	France	UK
Accreditations	<ul style="list-style-type: none"> <li>If OAO requires access to Eircom infrastructure, SMP operator provides a representative to supervise</li> </ul>	<ul style="list-style-type: none"> <li>OAO staff/contractors are vetted by SMP operator and granted same accreditations as the SMP operator</li> <li>Civil responsibility insurance</li> </ul>	<ul style="list-style-type: none"> <li>Subscription to contracts and agreements with Orange covering risks and interventions</li> </ul>	<ul style="list-style-type: none"> <li>Operators are responsible for conducting field surveys and cable installation, requiring ISO 9001 and BS25999 compliance</li> </ul>

From the table it can be seen that there is a common approach across the three case-study countries towards a self-service delivery model, giving more control to the OAOs, which is not the case in Ireland.

In all three countries studied, the desktop surveys are conducted by the OAOs with information provided by the SMP operator. The field surveys are also completed by the OAOs, except in the case of Portugal where field surveys are usually not necessary because of the high quality of the data available at the desktop survey stage. Where field surveys are required, these are conducted by the SMP operator and the results are used to update the desktop survey data.

Installation rules vary between the different countries. While in all cases it is the operator's responsibility to install cables, whether or not these must go in a sub-duct depends on the country. In France, the cable must go in some form of sub-duct, although this can be a flexible piping installed directly into the main duct. In the UK, all cabling must be installed into a sub-duct except in certain circumstances for the last 100 metres or so of the network. In Portugal, cables are installed directly into the duct or into shared sub-ducts.

Where capacity is restricted, each country has ways of maximizing available space. In Portugal, operators are required to remove any redundant cables. The SMP operator clears any blockages in the ducts, and provides alternative routes if necessary. In France, operators can remove any cables identified as unused "zero" cables, and the SMP operator will regroup cables where a single operator occupies several sub-ducts for example. In the UK, the SMP operator removes its redundant cables and builds new ducts where necessary.

In all three countries, duct and pole repairs are conducted by the SMP operator. None of them however require that the OAOs remove their own cabling first. Each country has its own accreditation required for contractors working on site, to cover risks and comply with the terms of insurance.

Of the three countries studied, the CEI access regime in Portugal has several characteristics that are favourable to access seekers. The scope of the Portuguese remedy is the most flexible of the three, allowing duct and pole access at any point in the network, not just in the access network as in UK and France.

Additionally, preliminary information in Portugal is available through an online database whereas in the UK and France it is provided on a case by case basis. In Portugal, MEO operates the most comprehensive network database, which is of high value to its customers as it allows them in many cases to skip the field survey. In contrast, the preliminary information available in the UK does not include availability, necessitating further work on behalf of the operator.

The take-up of duct access in Portugal has been quite significant. The number of responses to cable installation request on MEO ducts has grown from approximately 500/month in 2012 to more than 1500/month by the end of 2014 – see International Case Studies in the Appendix.

## Cartesian: CEI Service Delivery Process Equivalence Options

In contrast, there has been no material uptake of CEI access in the UK. In light of this the national regulatory authority, Ofcom, is currently reviewing the UK's CEI products within the context of a wider review of the communications market. Ofcom has published its initial conclusions and has stated: "Openreach will be required to provide greatly improved systems and processes for access to its ducts and poles. We will require Openreach to provide a new database showing the physical location and characteristics of its ducts and poles."<sup>32</sup>

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<sup>32</sup> Ofcom: "Initial conclusions from the Strategic Review of Digital Communications", 25 February 2016

## 5. Potential Options for Equivalence of Outputs (EOO) Improvement

In this section, we describe potential options for improving the operational processes and systems supporting the CEI product offerings under an EOO service delivery model.

The potential options address the factors identified and analysed in the previous section that may be contributing to the lack of take-up. The options are organised by product (duct access and pole access) and by operational process (fulfilment and assurance).

### 5.1 Duct Access – Improvement Options

Cartesian identified 33 potential options for improving the current processes and systems used to support the duct access product. Each of the options and their expected benefit are described in this section. We reference which of the options have parallels in our international case studies (i.e., Portugal, France and the UK). Full details of the country case studies can be found in Appendix 9.2.

The options are divided into each stage of the fulfilment and assurance processes.

#### 5.1.1 Fulfilment Process: Pre-Ordering Stage

The pre-ordering stage of the fulfilment process consists of three sub-stages as detailed in Section 3.1.2.

##### **Desktop Survey Sub-stage**

There are two approaches to improve the Desktop Survey stage, which generate two mutually exclusive sets of options. These are captured by the following two tables. The first table (table 7 – Desktop Survey – Potential Options (set A) describes the options for enhancing the current paper-based process in this sub-stage without structurally changing it. The activities remain with Eircom, but the timescales and Eircom's SLAs are improved. The second table (table B) describes potential options for replacing the current process and allowing the OAO to conduct the desktop survey activities. To that end, Eircom would share the duct topology and capacity usage information upfront with the OAO. An online tool would support such activity.

Eircom could use complementary data sources over time to improve the accuracy and comprehensiveness of the data. For instance, data could be obtained from the fibre cable records stored in the cabling inventory system, the work orders passed to the field force teams and the billing records in SAP. This could be expected to reduce the number of required field surveys and thus reduce cost to Eircom and the OAOs.

**Figure 7. Desktop Survey – Potential Options (Set A) for Improvement (via enhancement)**

ID	Potential Option	Reasons / Expected Benefit
A DS.1	Reduce maximum permitted time for the desktop survey (SLA)	<ul style="list-style-type: none"> <li>Currently, up to 13 working days permitted; this appears excessive given the low complexity of this activity; Eircom estimates [3&lt;] per task</li> <li>Expected Benefit: Greater OAO confidence in delivery timescales; potential reduction in end-to-end timescales</li> </ul>
A DS.2	Define the maximum number of point-to-point and point-to-multi point routes per OAO request (and update respective SLAs)	<ul style="list-style-type: none"> <li>Currently, one request with more than one route is treated on a project basis and not SLA is defined</li> <li>Expected Benefit: Address lack of clarity on SLA response times; improve expectation setting; Greater OAO confidence in delivery timescales; potential reduction in end-to-end timescales</li> <li>Example: In Portugal, the SMP operator accepts requests for routes with up to 50 duct links between two consecutive chambers</li> </ul>
A DS.3	Document how duct availability information is captured, stored and maintained	<ul style="list-style-type: none"> <li>Currently, this is not documented</li> <li>Expected Benefit: Improved transparency</li> <li>Example: In Portugal, the engineering rules e.g. to determine the duct space availability or the space to be kept free for maintenance purposes, are part of the published documentation</li> </ul>
A DS.4	Require Eircom to record and report on monthly KPIs (defined in KPI section below), segmenting internal and external requests	<ul style="list-style-type: none"> <li>Currently, no KPIs are defined in the published documentation</li> <li>Expected Benefit: Improved transparency; allows ComReg and OAOs to monitor Eircom’s process performance and to better understand the issues when they occur</li> </ul>
A DS.5	Reduce maximum permitted time for acknowledging receipt of request (SLA)	<ul style="list-style-type: none"> <li>Currently, up to 2 working days permitted; this appears excessive, and should be possible in the range of a couple of hours</li> <li>Expected Benefit: Reduced implementation timescales</li> </ul>

**Figure 8. Desktop Survey – Potential Options (Set B) for Improvement (via replacement)**

ID	Potential Option	Reasons / Expected Benefit
B DS.1	Provide duct structural and capacity information upfront to OAOs (inc. duct usage [3<])	<ul style="list-style-type: none"> <li>Currently, information is not shared with OAO; [3&lt;]</li> <li>The data sources should contain the following network data: Duct structural information, e.g., coordinates, addresses, network designs, duct characteristics and profiles, maps; and duct capacity usage information, e.g., free/used capacity by knowing the number of cables going inside via cable records in the inventory system, work orders and billing records, and the NGA sub-duct records</li> <li>Expected Benefit: Reduced implementation timescales; OAOs able to do a high-level feasibility assessment for a given area before desktop survey stage; leverage existing inventory capability to store duct usage info which makes it easier to share the info via an online interface/tool and improve data governance and management</li> <li>Example: This would be similar to the Portuguese and French cases</li> </ul>
B DS.2	Allow OAO to conduct the desktop survey instead of Eircom [dependency on B DS.1]	<ul style="list-style-type: none"> <li>Currently, the OAO requests the desktop survey from Eircom</li> <li>Expected Benefit: OAOs able to manage/control activity at own pace and cost; improved transparency</li> <li>Example: This would be similar to the Portuguese and French cases</li> </ul>

## Cartesian: CEI Service Delivery Process Equivalence Options

ID	Potential Option	Reasons / Expected Benefit
B DS.3	Document how duct availability information is captured, stored and maintained	<ul style="list-style-type: none"> <li>• Currently, this is not documented</li> <li>• Expected Benefit: Improved transparency</li> <li>• Example: In Portugal, the engineering rules e.g. to determine the duct space availability or the space to be kept free for maintenance purposes, are part of the published documentation</li> </ul>
B DS.4	Require Eircom to record and report on monthly KPIs (defined in KPI section below), segmenting internal and external requests	<ul style="list-style-type: none"> <li>• Currently, no KPIs are defined in the published documentation</li> <li>• Expected Benefit: Improved transparency; allows ComReg and OAOs to monitor Eircom's process performance and to better understand the issues when they occur</li> </ul>

### Field Survey Sub-Stage

The field survey sub-stage takes place when the desktop survey is not conclusive (i.e. the available information about duct structure and capacity usage levels are not good enough) or the duct capacity usage levels are high. The table below shows the potential options for improving this sub-stage.

The potential options include allowing the OAOs to choose whether to conduct the field survey themselves or request it from Eircom.

**Figure 9. Field Survey – Potential Options for Improvement**

ID	Potential Option	Reasons / Expected Benefit
DF.1	Allow OAO to conduct the field survey activity (using approved contractors)	<ul style="list-style-type: none"> <li>• Currently, the OAO requests the survey from Eircom</li> <li>• Expected Benefit: Full control to OAOs to manage activity at their own pace and cost if they have the expertise and resources; shared results to be used to update the inventory records on duct usage</li> <li>• Example: This is the case in France and in the UK. In Portugal, the SMP operator to carry the field inspection if the existing documentation is not enough (at no additional cost)</li> </ul>
DF.2	Require Eircom to fully document the procedure to be followed during field survey and make it available to OAOs together with current engineering rules	<ul style="list-style-type: none"> <li>• Currently, no description of the procedure or the engineering rules are available in the published documentation</li> <li>• Expected Benefit: guarantee that the OAO staff or sub-contractors follow Eircom's work practices and up to the defined standards when conducting the survey themselves; also, improved transparency</li> </ul>
DF.3	Use the results of the field survey to update the existing duct usage information/records	<ul style="list-style-type: none"> <li>• Currently, it's not clear if Eircom uses the results to update the duct records</li> <li>• Expected Benefit: improved duct usage records (gradually); improved data integrity</li> </ul>
DF.4	Require Eircom to record and report on monthly KPIs (defined in KPI section below), segmenting internal and external requests	<ul style="list-style-type: none"> <li>• Currently, no KPIs are defined in the published documentation</li> <li>• Expected Benefit: Improved transparency; allows ComReg and OAOs to monitor Eircom's process performance and to better understand the issues when they occur</li> </ul>
DF.5	Reduce maximum permitted time for acknowledging receipt of request (SLA)	<ul style="list-style-type: none"> <li>• Currently, up to 2 working days permitted; this appears excessive and should be possible in the range of a couple of hours</li> <li>• Expected Benefit: Reduced implementation timescales</li> </ul>

## Cartesian: CEI Service Delivery Process Equivalence Options

ID	Potential Option	Reasons / Expected Benefit
DF.6	Reduce maximum permitted time for field survey (SLA) conducted by Eircom	<ul style="list-style-type: none"> <li>Currently, up to 13 working days permitted; this appears excessive; Eircom estimates approx. [3&lt;] for the task duration ([3&lt;] in case the chamber is flooded)</li> <li>Expected Benefit: Reduced implementation timescales</li> <li>Example: In Portugal, if the SMP operator decides to conduct a field inspection as part of the feasibility study, the maximum permitted time for response is still the 8 working days</li> </ul>

### Sub-duct Design Sub-Stage

The table below shows the potential options for improving the sub-design stage. This stage takes place when an available continuous sub-duct route couldn't be found during the field survey. Currently, the rod, rope and test (RRT) activity is conducted at this stage by Eircom.

Another option would be for the OAO to coordinate the RRT with sub-duct and cable installation, potentially conducting all activities on same day. This would be only possible if we were also proposing a more radical approach where the inventory modelling only happens after the installation (as in the Portuguese case) because the RRT determines if there is an available route, e.g. different ducts or multi-core can be used, and this will affect the design and inventory modelling. In France, Orange only authorises access and installation after validating the field survey output (including the RRT results confirming availability, and work plan).

**Figure 10. Sub-duct Design – Potential Options for Improvement**

ID	Potential Option	Reasons / Expected Benefit
DD.1	Allow OAO to conduct the RRT and to do it during the field survey (previous stage) if route not available by chamber inspection (any route blockage to be communicated back to Eircom – assess and provide price quote)	<ul style="list-style-type: none"> <li>Currently, OAO requests RRT from Eircom</li> <li>Expected Benefit: Reduced implementation timescales; OAO in control of lead times but will have to request access consent to public authorities or private landlords and to communicate blockage cases to Eircom to resolve</li> <li>Example: This is the case in France; not applicable in Portugal</li> </ul>
DD.2	Require Eircom to record and report on monthly KPIs (defined in KPI section below), segmenting internal and external requests	<ul style="list-style-type: none"> <li>Currently, no KPIs are defined in the published documentation</li> <li>Expected Benefit: Improved transparency; allows ComReg and OAOs to monitor Eircom's process performance and to better understand the issues when they occur</li> </ul>

### 5.1.2 Fulfilment Process: Ordering and Post-Ordering Stages

The table below shows the potential options for improving the ordering stage. This includes options addressing the sub-duct reservation and cable installation activities as well.

Some of the options have a direct impact on the demarcation of roles and responsibilities of Eircom and OAOs. For instance, if the sub-duct is installed by the OAO (options O.1 in the table below), the ordering stage would consist of the inventory modelling of the proposed design by OAO, followed by the access handover. Note however, the OAO will retain the option to request the sub-duct installation by Eircom.

**Figure 11. Provisioning & Post-Provisioning – Potential Options for Improvement**

ID	Potential Option	Expected Benefit
DO.1	Allow the OAO to install the sub-duct and the cable together (optional)	<ul style="list-style-type: none"> <li>• Currently, Eircom installs the sub-duct and OAO the cable</li> <li>• Expected Benefit: avoid multiple consent requests, and public disruptions; reduced costs for the OAO and deployment timescales by allowing synergies among the two activities; but the OAO needs to provide final documentation pack after installation (e.g. cable labelling)</li> <li>• Example: This is the case in the UK; not applicable in Portugal</li> </ul>
DO.2	Sub-duct information (as per design) to be recorded in the inventory system for all orders (including sub-duct reservation orders) – i.e., inventory modelling	<ul style="list-style-type: none"> <li>• Currently, it's not specified in the published documentation if this will be done for OAOs; [X]; also, the reservation order records are kept in a spreadsheet</li> <li>• Expected Benefit: record kept both for internal and external customer orders; gradual contribution for improving the view of the duct usage in the access network;</li> <li>• It requires a new status indicating “reserved” versus “deployed” for the reserved versus installed sub-ducts</li> </ul>
DO.3	Reduce the maximum permitted time for provisioning sub-duct reservation (SLA)	<ul style="list-style-type: none"> <li>• Currently, up to 10 working days; this appears excessive for recording OAO order data in the inventory system (i.e., inventory modelling) given all the data required has been collected and validated; as a reference, Eircom estimates [X] for validating the OAO design for feasibility in MIP cases</li> <li>• Expected Benefit: Time to be similar to the SLA for providing of an in-situ sub-duct (same time for inventory modelling)</li> </ul>
DO.4	Reduce time for acknowledging the receipt of request for duct reservation	<ul style="list-style-type: none"> <li>• Currently, up to 2 working days permitted; this appears excessive and should be possible in the range of a couple of hours</li> <li>• Expected Benefit: Reduced implementation timescales</li> </ul>
DO.5	Allow OAO to supply own sub-duct for the interconnection duct (optional)	<ul style="list-style-type: none"> <li>• Currently, the sub-duct for the interconnection link is provided by Eircom</li> <li>• Expected Benefit: OAO to have the option to choose and have greater control of costs and delivery times;</li> <li>• Ability to coordinate activities with cable installation</li> <li>• OAO to follow Eircom's specifications for sub-duct characteristics</li> </ul>
DO.6	List of documents to be submitted by OAO for installation of interconnection sub-duct to be fully defined by Eircom	<ul style="list-style-type: none"> <li>• Currently, this is a key requirement for arranging the supervision for installing the interconnection sub-duct between OAO and Eircom chambers, but the full list of documents required showing/proving the preparation work is not specified in the published documentation (e.g. maps, photographs)</li> <li>• Expected Benefit: Improved transparency; reduced number of installations delayed due to missing documentation</li> </ul>
DO.7	Reduce maximum permitted time for provisioning in-situ sub-duct (SLA)	<ul style="list-style-type: none"> <li>• Currently, up to 10 working days; this appears excessive for recording OAO order data in the inventory system (i.e., inventory modelling) given all the data required has been collected and validated – similar to the SLA for completion of reservation orders; as a reference, Eircom estimates [X] for validating the OAO design for feasibility in MIP cases</li> <li>• Expected Benefit: Greater OAO confidence in delivery timescales; potential reduction in end-to-end timescales</li> </ul>

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ID	Potential Option	Expected Benefit
DO.8	Reduce maximum permitted time for sub-duct installation (if Eircom doing it)	<ul style="list-style-type: none"> <li>Currently, up to 40 working days is allowed</li> <li>This appears to be a worst case scenario and provides a large degree of leeway for more straightforward installations. Ideally, a shorter time would be offered for installations meeting certain criteria.</li> <li>Expected Benefit: Greater OAO confidence in delivery timescales; potential reduction in end-to-end timescales</li> </ul>
DO.9	Define new SLA to cope the delivery of the sub-duct for the interconnection (when supplied by Eircom)	<ul style="list-style-type: none"> <li>Currently, the sub-duct for the interconnection link is provided by Eircom and no SLA is defined</li> <li>Expected Benefit: Improved transparency; reduce OAO business/operational risk</li> </ul>
DO.10	Define SLA for emergency CoW requests during OAO installation	<ul style="list-style-type: none"> <li>Currently, Eircom offer this service but there is no associated SLA</li> <li>Expected Benefit: Improved transparency; reduced OAO business/operational risk</li> </ul>
DO.11	Require Eircom to record and report on monthly KPIs (defined in KPI section below), segmenting internal and external requests	<ul style="list-style-type: none"> <li>Currently, no KPIs are defined in the published documentation</li> <li>Expected Benefit: Improved transparency; allows ComReg and OAOs to monitor Eircom's process performance and to better understand the issues when they occur</li> </ul>

### 5.1.3 Assurance Process

The assurance process consists mainly of activities in the customer domain, i.e., fault handling, repair and replacement of faulty parts, which involve the coordination and definition of responsibilities between Eircom and the OAO.

The table below describes the identified options for improving the current assurance process as defined by Eircom.

**Figure 12. Assurance – Potential Options for Improvement**

ID	Potential Option	Expected Benefit
DA.1	Enable <i>in situ</i> repair of damaged cables by providing OAO access to intermediate chambers, enabling break-out of cables from sub-ducts in those chambers, and allowing co-location of OAO joint boxes in those chambers (subject to survey)	<ul style="list-style-type: none"> <li>Currently, OAOs are required to remove/reinstate entire cable</li> <li>Expected Benefit: Improved repair times; better customer experience; lower cost</li> <li>Example: in the UK, the OAO have access to intermediate chambers and are responsible to repair the cables and sub-ducts</li> </ul>
DA.2	Define types of minor faults and assign priority levels for resolution (and update existing SLA)	<ul style="list-style-type: none"> <li>Currently, the minor fault definition is too broad (only 1 type and no priority are defined and assigned to faults)</li> <li>Expected Benefit: Improved fault prioritisation; reduced business risk to OAO</li> </ul>
DA.3	Include a maximum permitted time for fault repair by Eircom (SLA)	<ul style="list-style-type: none"> <li>Currently, there is no time/SLA for maximum repair time</li> <li>Expected Benefit: Improved OAO understanding of repair timescales</li> </ul>

## Cartesian: CEI Service Delivery Process Equivalence Options

ID	Potential Option	Expected Benefit
DA.4	Reduce maximum permitted time to respond after receipt of fault repair and planned /unplanned maintenance requests	<ul style="list-style-type: none"> <li>Currently, up to one working day is permitted; this appears excessive and should be possible in the range of a couple of hours</li> <li>Expected Benefit: Reduced repair/maintenance repair timescales</li> </ul>
DA.5	Fault reporting should go via a dedicated technical team (minor faults or unplanned maintenance requests)	<ul style="list-style-type: none"> <li>Currently, fault reports go via the OAO's wholesale account manager; this does not provide a reliable, 24x7 point of contact for handling network faults effectively</li> <li>Benefit: Improved repair times; better end-customer experience</li> <li>Example: This is the case in Portugal</li> </ul>
DA.6	Reduce maximum permitted time for Eircom to provide OAO with a date for the supervised access when required/requested	<ul style="list-style-type: none"> <li>Currently, there a minimum of 3 working days; this appears excessive given this access request may be related with a severe, customer-affecting fault</li> <li>Expected Benefit: reduced supervised access approval timescales; reduced business risk to OAO</li> <li>Example: In Portugal, the SMP operator commits to a maximum period of 24 hours for planned maintenance requests, 4 hours to unplanned maintenance requests with a 95% availability</li> </ul>
DA.7	Require Eircom to record and report on monthly KPIs (defined in KPI section below), segmenting internal and external requests	<ul style="list-style-type: none"> <li>Currently, no KPIs are defined in the published documentation</li> <li>Expected Benefit: Improved transparency; allows ComReg and OAOs to monitor Eircom's process performance and to better understand the issues when they occur</li> </ul>

### 5.1.4 Key Performance Indicators (KPIs)

The table below lists 23 potential KPIs for the fulfilment and assurance processes. These KPIs will be captured by Eircom on a monthly basis and segmented by internal and external requests.

This is critical to monitor the performance of Eircom's product offering and assure the offered SLAs are met. Additional KPIs can be further defined by combining some of the identified KPIs.

The KPIs where response times are to be measured, the start and stop times should be recorded for audit purposes.

**Figure 13. Monthly KPIs for the Fulfilment and Assurance Processes – Duct Product**

Process Stage	ID	KPIs
Desktop Survey (for options in Table A)	DK.1	Number of desktop surveys
	DK.2	Number of point-to-point routes per single request
	DK.3	Response times for single survey requests
	DK.4	Response times for multiple survey requests
Desktop Survey (for options in Table B)	DK.5	Number of requests for duct information (OAO conducting desktop survey)
	DK.6	Response time with requested data
Field Survey	DK.7	Number of field surveys conducted by OAOs and Eircom
	DK.8	Response times for single survey requests

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Process Stage	ID	KPIs
	DK.9	Response times for multiple survey requests (conducted by Eircom)
Sub-duct Design	DK.10	Number of sub-duct design / RRT required
	DK.11	Time to get consent/permission to unblock duct
	DK.12	Number of cases where consent is required to sub-duct orders
	DK.13	Number of cases where excess fee applies during RRT
	DK.14	Number of cases where a full route is not available after field survey and sub-duct design stages
Ordering/ Post-provisioning	DK.15	Number of orders required in total
	DK.16	Number of sub-duct installation orders
	DK.17	Number of orders completed on time – per order type (sub-duct in-situ and sub-duct installation)
Assurance	DK.18	Number of fault cases per sub-duct damage type (to be defined)
	DK.19	Sub-duct mean time to repair per damage type
	DK.20	Number of sub-duct faults per type
	DK.21	Number of times Eircom fails to notify OAO about planned maintenance within SLA times
	DK.22	Number of rejected access requests (inc. reason)
	DK.23	Acceptance time of supervised access requests

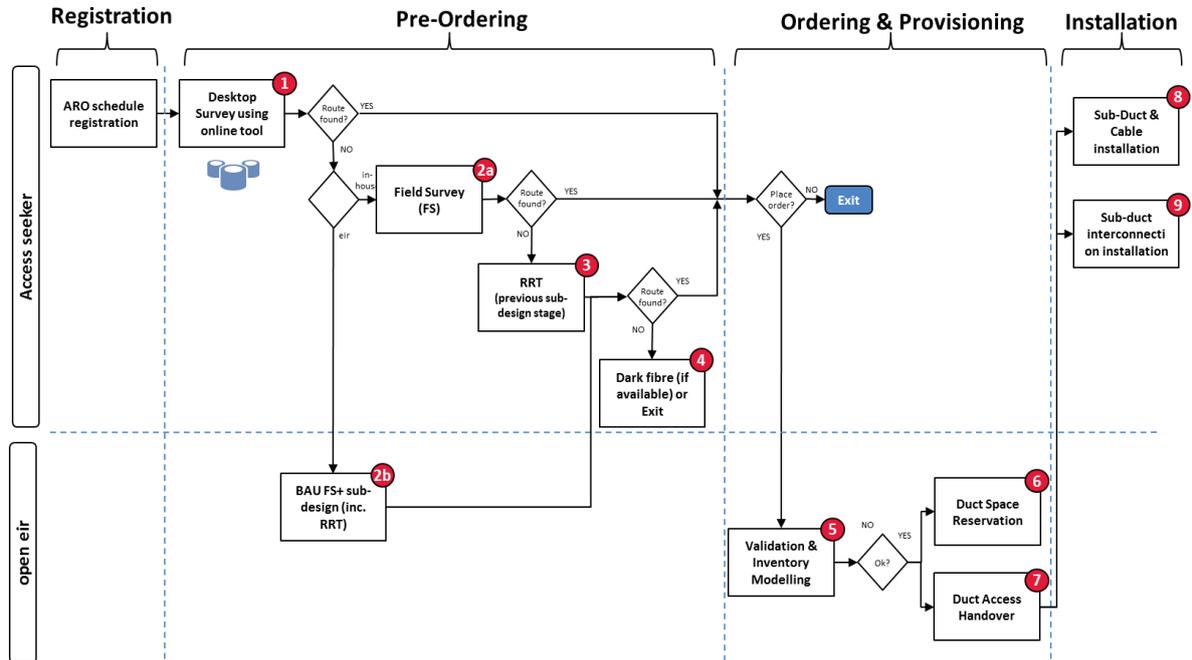
### 5.1.5 End-to-end Process Improvement Proposal

Some of the potential options described above for improving the EOO service delivery model have an impact at the activity level (e.g. procedures, documentation, and information management) and others have an impact directly at the end-to-end process flow. Figure 14 illustrates the end-to-end fulfilment process with the inclusion of the potential options. The major changes are:

- The development of an online service to provide on-demand duct structural and capacity usage information. This allows the OAO to conduct the OAO survey activity (reference 1 in Figure 14)
- The option for the OAO to conduct field survey and RRT (reference 2a and 3 in Figure 14). These two activities can be conducted together. As an alternative, the OAO can still request these activities to be done by Eircom (reference 2b in Figure 14)
- The sub-design stage is replaced by the OAO conducting the RRT (reference 3 in Figure 14), combining the validation of the submitted design and OAO order data recording in the inventory system (i.e. inventory modelling) in the ordering stage of the fulfilment process (reference 5 in Figure 14).
- Dark Fibre (reference 4 in Figure 14) is still offered as an alternative product if sub-duct space is not available; more visibility on the fulfilment process is required.

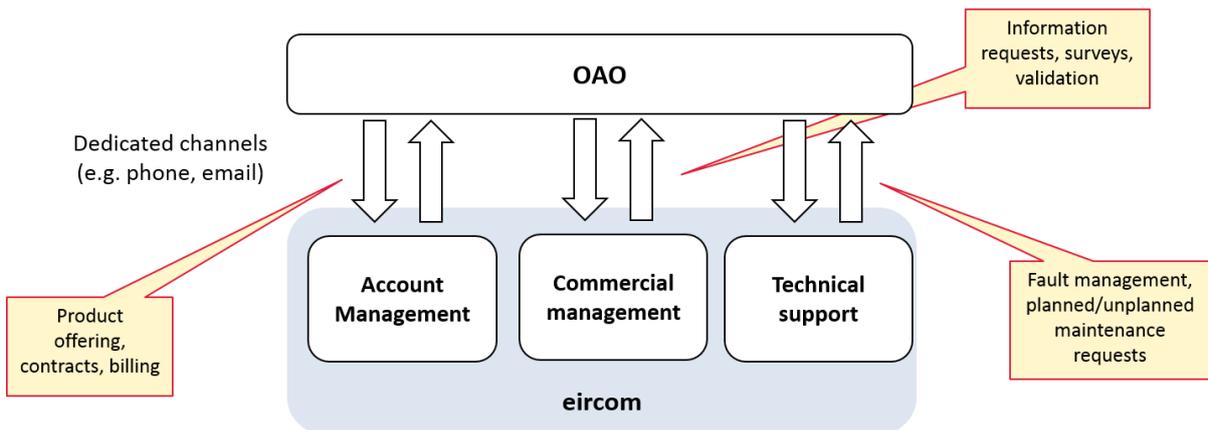
These potential changes reduce the OAO dependency on Eircom – the number of decision points are reduced from three to one – and provide the OAO more control over the time and costs of the end-to-end process.

**Figure 14. Identified Changes to the Fulfilment Process to improve the EOO service Delivery Model**



Regarding the assurance process, the major change is the separation of the account management from the commercial and technical support functions. The potential new functional model is illustrated in the figure below.

**Figure 15. Potential New Framework for Assurance**



This framework provides a clear and reliable, 24x7 point of contact for handling network faults effectively, improving repair times and end-customer experience.

## 5.2 Pole Access – Improvement Options

Cartesian identified 27 potential options for improving the current processes and systems used to support the pole access product. Each of the options and their expected benefit are described in this section. We reference which of the options have parallels in our international case studies (i.e., Portugal, France and the UK). Full details of the country case studies can be found in Appendix 9.2.

The identified options are divided into each stage of the fulfilment and assurance processes.

### 5.2.1 Fulfilment Process: OAO Survey Stage

The OAO survey stage includes a field visit for visual inspection of the poles and the aerial route. The table below shows the potential options for improving this stage of the fulfilment process.

Potential improvements to the survey stage include making pole inventory and capacity information available to OAOs.

**Figure 16. OAO Survey – Potential Options for Improvement**

ID	Potential Option	Expected Benefit
PS.1	Replace the desktop estimate service with a discrete pricing list (per unit of cost) to be included in the published documentation	<ul style="list-style-type: none"> <li>• Currently, Eircom provides a high-level price estimate based on partial available information; however, there are so many variables that can move up significantly the final price that the service adds low value</li> <li>• Expected Benefit: OAO able to better forecast the potential costs; reduced implementation timescales</li> <li>• Example: This is the case in Portugal and in France</li> </ul>
PS.2	Record pole inventory/structural and capacity usage information in a physical inventory system	<ul style="list-style-type: none"> <li>• Currently, pole information is stored in a separate database of the pole testing programme</li> <li>• These data sources should contain the following network data: Pole structural information, e.g., coordinates, addresses, network designs, technical profiles, maps; and pole capacity usage information, e.g., free/used capacity by knowing the number of cables on poles via cable records in the inventory system, work orders and billing records</li> <li>• Expected Benefit: Centralised database for the whole access network (duct and pole) which facilitates data housekeeping and reduces risk of data inaccuracy</li> <li>• Complete information about an aerial route by including data about the poles, building a more accurate view of the pole network and its capacity usage</li> <li>• Example: In Portugal, both the aerial routes and pole information are stored and provided together</li> </ul>

## Cartesian: CEI Service Delivery Process Equivalence Options

ID	Potential Option	Expected Benefit
PS.3	Make available pole usage information upfront to OAOs during OAO survey phase [in addition to the pole inventory/structural]	<ul style="list-style-type: none"> <li>• Currently, only pole location (x-y coordinates) information is available; Eircom could extend the current file shared on request with usage information (particularly relevant in Ireland given the size of the pole network in rural areas)</li> <li>• Expected Benefit: reduced implementation time and costs for the OAO preparing survey (including less field visits); consistent process across duct and pole access products</li> <li>• Example: While this is not the case in Portugal and France, given the size of the pole network in Ireland, there is an argument to justify a more feature-rich pole access product, closer to the duct one. In Portugal, information is provided on the aerial routes and the main poles on those routes</li> </ul>
PS.4	Define the OAO Survey format upfront and include the full details in the published documentation	<ul style="list-style-type: none"> <li>• Currently, documentation is required for survey acceptance but the exact data required is not defined in full in the published documentation</li> <li>• Expected Benefit: By specifying the format and the exact information that Eircom requires from the surveys, it may reduce the number of rejected design orders and save operators time and effort; improved transparency</li> <li>• Example: In Portugal, the order form contains all the data fields required to avoid ambiguity and an explanation to fulfil them</li> </ul>
PS.5	Reduce maximum permitted time for acknowledging receipt of request (SLA)	<ul style="list-style-type: none"> <li>• Currently, up to 2 working days permitted which appears excessive and should be possible in the range of two hours</li> <li>• Expected Benefit: Reduced implementation timescales</li> <li>• Example: This is the case in Portugal and in France</li> </ul>
PS.6	Require Eircom to record and report on monthly KPIs (defined in KPI section), segmenting internal and external requests	<ul style="list-style-type: none"> <li>• Currently, no KPIs are defined in the published documentation</li> <li>• Expected Benefit: Improved transparency; allows ComReg and OAOs to monitor Eircom's process performance and to better understand the issues when they occur</li> </ul>

### 5.2.2 Fulfilment Process: Design Stage

This table shows the identified options for improving the design stage of the fulfilment process carried out by Eircom. There are five key options.

This stage is not clearly defined in the published documentation. The design stage seems to repeat work already carried out by the OAO during the previous stage – the OAO submits a comprehensive list of documentation prepared during the OAO Survey stage. Making this stage just a validation step instead would have a huge impact on the fulfilment timelines given the current offered SLA for this stage.

**Figure 17. Eircom Design – Potential Options for EOO Improvement**

ID	Potential Option	Expected Benefit
PD.1	Reduce maximum permitted time for the provision of a pole route design plan (SLA)	<ul style="list-style-type: none"> <li>Currently, up to 30 working days; this appears excessive because this activity seems a repetition of the work done by the OAO – which provides a comprehensive documentation pack - and moreover given this information is not stored in the inventory at the moment; as a reference, Eircom estimates [3&lt;] for validating OAO submitted design for feasibility in MIP cases</li> <li>Expected Benefit: reduced implementation timescales</li> </ul>
PD.2	Record the output of the network design activity in the inventory system	<ul style="list-style-type: none"> <li>Currently, pole information and aerial routes are not stored in the inventory; however Eircom could leverage on the available physical and logical functionalities of the inventory system to speed up the recording of OAO order data in the inventory system (i.e., inventory modelling) Expected Benefit: regular update of the network records, gradual improvement of the pole network records about capacity usage; indirectly, it may also reduce the need for physical inspection if upfront data about poles and aerial routes is more accurate</li> </ul>
PD.3	Require Eircom to record and report on monthly KPIs (defined in KPI section below), segmenting internal and external requests	<ul style="list-style-type: none"> <li>Currently, no KPIs are defined in the published documentation</li> <li>Expected Benefit: Improved transparency; allows ComReg and OAOs to monitor Eircom’s process performance and to better understand the issues when they occur</li> </ul>

**5.2.3 Fulfilment Process: Pole Ordering / Provisioning Stage**

The table below lists the identified options for improving both the ordering/provisioning stage of the fulfilment process as well as the pole reservation and installation stages.

**Figure 18. Pole Ordering/Provisioning – Potential Options for Improvement**

ID	Potential Option	Expected Benefit
PO.1	Make Eircom responsible for preparing the route (if required) for OAO to install the cables independently of the size of the order request	<ul style="list-style-type: none"> <li>Currently, the responsibility of this activity varies according to the size of the order request (small order or MIP); also in the published documentation there is contradictory information about it</li> <li>Expected Benefit: operational simplification, cost and time reduction</li> </ul>

## Cartesian: CEI Service Delivery Process Equivalence Options

ID	Potential Option	Expected Benefit
PO.2	Reduce maximum permitted time for route preparation (SLA)	<ul style="list-style-type: none"> <li>Currently this is 40 working days, and only applies to 'single route' orders; this appears excessive since the time for resolving an unexpected route blockage or requesting consents is treated as additional time; as a reference, Eircom estimates [3&lt;] for route preparation planning activity in MIP cases</li> <li>Expected Benefit: Greater OAO confidence in delivery timescales; potential reduction in end-to-end timescales</li> </ul>
PO.3	Require Eircom to start route preparation if OAO raises the need for it as part of the survey	<ul style="list-style-type: none"> <li>Currently, the route preparation only starts at the ordering stage; this could be triggered earlier in the process if the OAO agrees to go ahead with installation at that point</li> <li>Expected Benefit: reduced implementation timescales</li> </ul>
PO.4	Record the changes resulting from the route preparation activity in the inventory system	<ul style="list-style-type: none"> <li>Currently, it is not clear where or even if these changes are being recorded</li> <li>Expected Benefit: keep it up to date network records and reduce the need for future surveys</li> <li>Example: This is the case in Portugal</li> </ul>
PO.5	Define new SLA for emergency help and request of CoW during OAO cable installation	<ul style="list-style-type: none"> <li>Currently there is no SLA</li> <li>Expected Benefit: reduced timescales and gives more security and certainty to OAO during installation process</li> </ul>
PO.6	Store pole furniture requests in their inventory system as a record of pole usage	<ul style="list-style-type: none"> <li>Currently, Eircom do not store the detailed info sent by OAO with the pole furniture request</li> <li>Expected Benefit: allow network records to be updated gradually</li> </ul>
PO.7	Additional pole furniture request to go together with the OAO survey	<ul style="list-style-type: none"> <li>Currently, pole furniture orders must be raised separately and submitted to account managers for approval</li> <li>Expected Benefit: Avoid late delays</li> </ul>
PO.8	Reduce maximum permitted time for pole reservation	<ul style="list-style-type: none"> <li>Currently, up to 10 working days; this appears excessive given pole route info is not stored in any system and all the required work pack has been prepared and delivered to Eircom</li> <li>Expected Benefit: Greater OAO confidence in delivery timescales; potential reduction in end-to-end timescales for reservation orders and reduce speculation around reservation request progress</li> </ul>
PO.9	Store route reservation orders in the inventory system [dependency on PS.2]	<ul style="list-style-type: none"> <li>Currently, pole and aerial route reservation orders are not stored in the inventory; this could provide an incomplete picture of the pole network usage</li> <li>Expected Benefit: improved pole network usage information; data governance and housekeeping</li> </ul>
PO.10	Require Eircom to record and report on monthly KPIs (defined in KPI section), segmenting internal and external requests	<ul style="list-style-type: none"> <li>Currently, no KPIs are defined in the published documentation</li> <li>Expected Benefit: Improved transparency; allows ComReg and OAOs to monitor Eircom's process performance and to better understand the issues when they occur</li> </ul>

### 5.2.4 Assurance Process

The assurance process consists mainly of the activities in the customer domain, i.e., fault handling, repair and replacement of faulty parts, which involves the coordination and definition of responsibilities between Eircom and the OAO.

The table below lists the potential options for improving the stages of the assurance process. Fault handling, pole and cable repair, and planned and unplanned maintenance activities are considered.

There are eight identified options. Note that one of the key concerns was the current SLA offering which adds additional business risk to the OAOs.

**Figure 19. Pole Assurance/Fault Management – Potential Options for Improvement**

ID	Potential Option	Expected Benefit
PA.1	Allow Eircom to remove and reinstate OAO cables and equipment for planned maintenance activity on poles and aerial routes (having first notified the OAO)	<ul style="list-style-type: none"> <li>Currently the operators are informed a minimum of ten days before any proposed works and they are notified of any work they need to undertake to facilitate the work</li> <li>Expected Benefit: Reduced maintenance timescales; Reduce the amount of coordination required to remove all the cables from all the OAOs before any pole repair</li> </ul>
PA.2	Make OAO responsible for requesting the necessary consent permission for cable repair (when OAO is repairing the cable)	<ul style="list-style-type: none"> <li>Currently, consent is requested by Eircom or by OAO in case of the MIP</li> <li>Expected Benefit: increased control of the process times and costs to the OAO</li> <li>Example: This is the case in Portugal</li> </ul>
PA.3	Define minimum permitted time to notify the OAOs in case of unplanned maintenance activity (new SLA)	<ul style="list-style-type: none"> <li>Currently, there is no SLA addressing this; it should be possible to notify OAOs within 2 hours.</li> <li>Expected Benefit: Greater OAO confidence in repair/maintenance repair timescales; potential reduction in end-to-end timescales</li> </ul>
PA.4	Define types of minor faults and assign priority levels for resolution (and update existing SLA)	<ul style="list-style-type: none"> <li>Currently minor faults are not defined</li> <li>Expected Benefit: Improved fault prioritization; reduced business risk to OAO</li> </ul>
PA.5	Include a maximum permitted time for fault repair by Eircom (SLA)	<ul style="list-style-type: none"> <li>Currently there are only SLAs for status updates (2 working days)</li> <li>Expected Benefit: Improved customer experience; enable OAO to better manage business risk</li> </ul>
PA.6	Reduce maximum permitted time to respond after receipt of fault repair and planned /unplanned maintenance requests	<ul style="list-style-type: none"> <li>Currently, up to one working day is permitted; this appears excessive and should be possible in the range of a couple of hours</li> <li>Expected Benefit: Greater OAO confidence in repair/maintenance repair timescales; potential reduction in end-to-end timescales</li> </ul>
PA.7	Fault reporting should go via a dedicated technical team (minor faults or unplanned maintenance requests)	<ul style="list-style-type: none"> <li>Currently, fault reports go via the OAO's wholesale account manager; this does not provide a reliable, 24x7 point of contact for handling network faults effectively</li> <li>Benefit: Improved repair times; better end-customer experience</li> <li>Example: This is the case in Portugal</li> </ul>

## Cartesian: CEI Service Delivery Process Equivalence Options

ID	Potential Option	Expected Benefit
PA.8	Require Eircom to record and report on monthly KPIs (defined in KPI section below), segmenting internal and external requests	<ul style="list-style-type: none"> <li>Currently, no KPIs are defined in the published documentation</li> <li>Expected Benefit: Improved transparency; allows ComReg and OAOs to monitor Eircom's process performance and to better understand the issues when they occur</li> </ul>

### 5.2.5 Key Performance Indicators (KPIs)

The table below lists 14 potential KPIs for the fulfilment and assurance processes. These KPIs will be captured by Eircom on a monthly basis and segmented by internal and external requests.

This is critical to monitor the performance of Eircom's product offering and assure the offered SLAs are met. Additional KPIs can be further defined by combining some of the identified KPIs.

The KPIs where response times are to be measured, the start and stop times should be recorded for audit purposes.

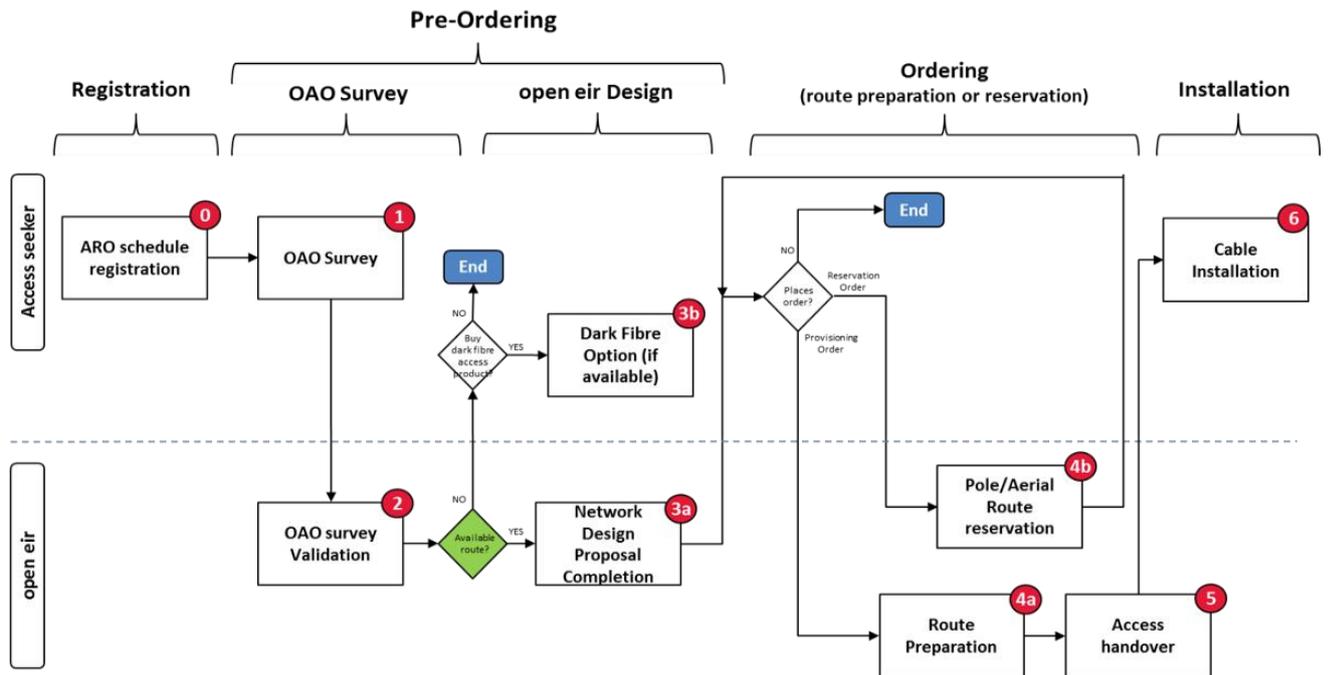
**Figure 20. KPIs Monthly KPIs for the Fulfilment and Assurance Processes – Pole Product**

Process Stage	ID	KPI
OAO Survey	PK.1	Number of OAO surveys
	PK.2	Number of accurate/inaccurate pole information (OAO to send it)
	PK.3	Number of rejected design order forms due to incompleteness
	PK.4	Number of poles in bad condition per OAO survey
	PK.5	Response time to validate survey
Eircom Design	PK.6	Number of Design requests
	PK.7	Response time per order (inc. timestamp for audit purposes)
Ordering	PK.8	Number of cases where excess fee is applicable during route preparation (blockage)
	PK.9	Completion time per order of the route preparation activity
Installation	PK.10	Response time per CoW request for emergency help
Fault Management	PK.11	Number of cases per pole fault type
	PK.12	Mean time to repair per fault type
	PK.13	Number of rejected access requests (inc. reason)
	PK.14	Acceptance time of access requests

### 5.2.6 End-to-end Process Improvement Proposal

Although the identified options for pole are mostly at activity-level (procedures, documentation, etc.), they also have a small impact on the current end-to-end process flow. The Network Design Proposal Completion activity would entail Eircom completing the design with any additional details on their side. Dark Fibre (reference 3b in Figure 21) is still offered as an alternative if pole space is not available (similar to duct); more visibility on the fulfilment process is required.

Figure 21. Identified Changes to the Pole Fulfilment Process to improve the EOO service Delivery Model



For assurance, similarly to the options in the duct product – see Section 5.1.5 for more details – Eircom could create a defined customer support framework with a clear separation between account management, commercial and technical support. Faults would be communicated to a dedicated technical support rather than via the account or product manager

## 6. Potential Options for Equivalent of Inputs (EOI) Improvement

An alternative option for ComReg to improve the current CEI remedy would be to transition to an Equivalence of Inputs (EOI) model.

From an OAO perspective, the EOI model would appear superficially similar to EOO. The major difference is that Eircom would also be required to consume the same service as the OAOs, using the same processes and systems. The potential options for enhancing CEI under EOO are therefore also applicable to an EOI model.

As defined by ComReg, the EOI service delivery model means that “Eircom shall provide all services and information to all Access Seekers and to itself in the same timescales, and on the same terms and conditions (including price and service levels) by means of the same systems and processes. In particular, it includes the use by Eircom of such systems and processes in the same way and with the same degree of reliability and performance when providing services and information to all Access Seekers as well as to itself”<sup>33</sup>

An important consideration in the implementation of an EOI model is the division of roles and responsibilities within Eircom. It is expected that certain roles would need to be redefined, for example where individuals perform activities of both the access seeker and access provider. These organisational design issues are beyond the scope of this report.

### 6.1 Duct Access

Below, we identify potential options to implement an EOI service delivery model for the Duct Access product. These options are incremental to those previously set-out for improving the EOO service delivery model in Section 5.1, above.

**Figure 22. Potential Options for EOI – Duct Access**

ID	Potential Option	Comments
DE.1	Use of the same data sources supporting the survey activities to ensure equal access to network data	<ul style="list-style-type: none"> <li>Cable and duct information would need to be stored in different systems                             <ul style="list-style-type: none"> <li>The duct database would hold information about duct and sub-duct usage, i.e. cable occupancy and ownership</li> </ul> </li> <li>Eircom’s cable routes would be held separately</li> </ul>
DE.2	Use of the same systems for storing any network related data (e.g. from surveys and post-installation activities) and deriving accurate usage levels	
DE.3	Use of the same order forms and the same order request channels	

<sup>33</sup> Next Generation Access (‘NGA’): Proposed Remedies for Next Generation Access Markets, ComReg 12/27, 04/04/2012

## Cartesian: CEI Service Delivery Process Equivalence Options

ID	Potential Option	Comments
DE.4	Use of the same SLAs	Eircom's downstream functions will need to consume the CEI products on an equivalent basis
DE.5	Use of the same fulfilment and assurance processes	<ul style="list-style-type: none"> <li>The orders forms and request channels would need to be the same</li> <li>Eircom's downstream functions will need to incorporate these into their workflow</li> <li>This may also require an internal account manager position to be created</li> </ul>
DE.6	The definition and implementation of a Data Governance Model	<ul style="list-style-type: none"> <li>This is essential to ensure the defined processes are followed</li> <li>It requires the definition of responsibilities for each role, access requirements and restrictions for specific roles, and the creation of records and logs for data access that can be used for audit purposes</li> </ul>
DE.7	Use of KPIs to help monitoring the processes performance and SLA breaches	<ul style="list-style-type: none"> <li>A list of KPIs should be defined and used to oversee the execution and effectiveness of the implementation of the EOI approach; these should also be used to monitor all of the SLAs between Eircom and all operators</li> <li>SLAs for should be broken out per OAO (including Eircom), as in France and Portugal, to show if the processes are being met</li> </ul>

In addition to the above conditions, there are also some changes to the way Eircom will consume the same service as the OAOs, using the same processes and systems. The table below sets out the interfaces of the process where Eircom would need to operate equivalently, e.g. Eircom conducts desktop survey using online database.

**Figure 23. List of New Internal Activities for Eircom to Follow for Duct Offering**

Processes Stages		New Action required from Eircom
Pre-ordering	Desktop survey	<ul style="list-style-type: none"> <li>Conduct desktop survey using the shared online database</li> </ul>
	Field survey	<ul style="list-style-type: none"> <li>Conduct field survey using agreed industry-wide process</li> </ul>
	Design	<ul style="list-style-type: none"> <li>Conduct RRT and designs own sub-duct route using agreed industry-wide process</li> </ul>
Ordering	Ordering	<ul style="list-style-type: none"> <li>Same order request channels as the other operators and the same forms</li> </ul>
	Post-ordering	<ul style="list-style-type: none"> <li>Same installation processes</li> </ul>
Assurance	Fault Reporting	<ul style="list-style-type: none"> <li>Same fault reporting channels and the same SLAs as offered to the OAOs</li> </ul>

## 6.2 Pole Access

Below, we identify potential options to implement an EOI service delivery model for the Pole Access product. These options are incremental to those previously set-out for improving the EOO service delivery model in Section 5.2, above.

**Figure 24. Potential Options for EOI – Pole Access**

ID	Potential Option	Comments
DE.1	Use of the same data sources supporting the survey activities to ensure equal access to network data	<ul style="list-style-type: none"> <li>Cable and pole information would need to be stored in different systems                             <ul style="list-style-type: none"> <li>The pole database would hold information about pole and pole usage, i.e. cable occupancy and ownership</li> </ul> </li> <li>Eircom’s cable routes would be held separately</li> </ul>
DE.2	Use of the same systems for storing any network related data (e.g. from surveys and post-installation activities) and deriving accurate usage levels	
DE.3	Use of the same order forms and the same order request channels	Eircom’s downstream functions will need to consume the CEI products on an equivalent basis <ul style="list-style-type: none"> <li>The orders forms and request channels would need to be the same</li> <li>Eircom’s downstream functions will need to incorporate these into their workflow</li> <li>This may also require an internal account manager position to be created</li> </ul>
DE.4	Use of the same SLAs	
DE.5	Use of the same fulfilment and assurance processes	
DE.6	The definition and implementation of a Data Governance Model	<ul style="list-style-type: none"> <li>This is essential to ensure the defined processes are followed</li> <li>It requires the definition of responsibilities for each role, access requirements and restrictions for specific roles, and the creation of records and logs for data access that can be used for audit purposes</li> </ul>
DE.7	Use of KPIs to help monitoring the processes performance and SLA breaches	<ul style="list-style-type: none"> <li>A list of KPIs should be defined and used to oversee the execution and effectiveness of the implementation of the EOI approach; these should also be used to monitor all of the SLAs between Eircom and all operators</li> <li>SLAs for should be broken out per OAO (including Eircom), as in France and Portugal, to show if the processes are being met</li> </ul>

In addition to the above conditions, there are also some changes to the way Eircom will consume the same service as the OAOs, using the same processes and systems. The table below sets out the interfaces of the process where Eircom would need to operate equivalently, e.g. Eircom conducts desktop survey using online database.

**Figure 25. List of new internal activities for Eircom to follow for Pole Offering**

Processes Stages		New Action required from Eircom
Pre-ordering	Desktop survey	<ul style="list-style-type: none"> <li>Conduct survey using the shared online database and carrying out field inspection whenever required</li> </ul>
	Design	<ul style="list-style-type: none"> <li>Submit survey via the defined order handling channels</li> </ul>
Ordering	Ordering	<ul style="list-style-type: none"> <li>Use the same order request channels as the OAOs and the same forms</li> </ul>
	Post-ordering	<ul style="list-style-type: none"> <li>Same installation processes</li> </ul>
Assurance	Fault Reporting	<ul style="list-style-type: none"> <li>Same fault reporting channels and the same SLAs as offered to the OAOs</li> </ul>

## 7. Impact Assessment

In this section, we present our impact assessment of the options, identified in Sections 5 and 6, to the business processes and system applications involved in the delivery of the duct and pole products.

### 7.1 TM Forum eTOM and TAM Frameworks

In order to apply a common language when referring to application and business process names, we used the TM Forum eTOM and TAM frameworks to conduct the impact assessment.<sup>34</sup>

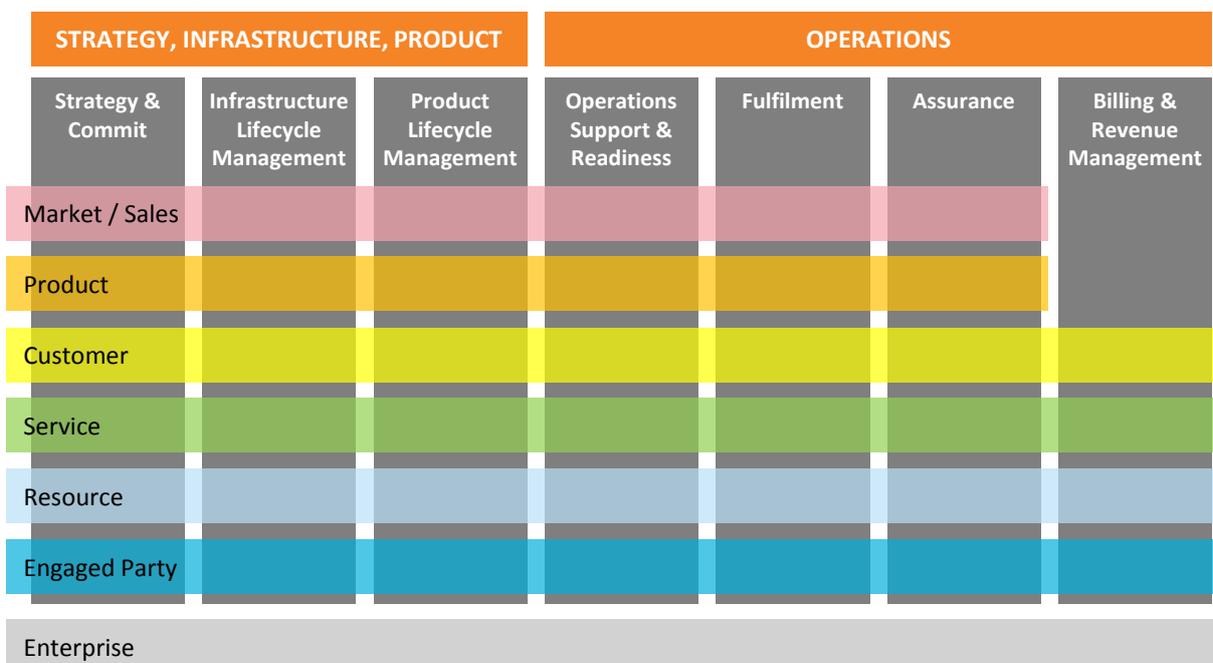
The TM Forum is an industry association representing service providers and vendors in the telecoms sector. eTOM is a hierarchical catalogue of the key business processes required to run a service-focused business, and can be applied in business process design, integration, procurement, etc. TAM is a hierarchical map of the various system applications that deliver the OSS and BSS business capabilities across an organisation.

#### 7.1.1 Application of eTOM for process assessment

Figure 26 provides an overview of the eTOM framework. For this project, we focused on the operational process areas for Fulfilment and Assurance; Billing & Revenue Management was beyond the scope of the project; no changes would be made in Operations, Support & Readiness (OSR), although this function would implement the changes in Fulfilment and Assurance.

For Fulfilment and Assurance, we focused on the Customer, Service and Resource domains within the organisation (i.e., the horizontal areas representing the management functions).

**Figure 26. High-level Representation of the eTOM Framework (illustrative)**



<sup>34</sup> TM Forum TAM Documentation R15.5.0

## Cartesian: CEI Service Delivery Process Equivalence Options

Using the eTOM framework, we identified processes within the Fulfilment and Assurance areas that would be impacted by the potential changes, as listed below:

- **Fulfilment:** Order Handling, Service Configuration and Activation, Resource Provisioning
- **Assurance:** Problem Handling, Customer QoS/SLA Management, Service Problem Management, Service Quality Management
- **Both:** Customer Interaction Management, Customer Information Management

The table below contains the high-level description of each of the Level 2 processes in these areas. The descriptions below are sourced from the TM Forum’s eTOM framework and are included for ease of reference.

**Figure 27. Description of the Impacted Processes as defined by the eTOM Framework**

eTOM – Level 1	eTOM – Level 2	Description
Fulfilment		<ul style="list-style-type: none"> <li>Group of processes responsible for providing customers with the requested products in a timely and correct manner; It includes areas such as selling, order handling, resource provisioning among others</li> </ul>
	Order Handling	<ul style="list-style-type: none"> <li>Order Handling processes are responsible for accepting and issuing orders. They deal with pre-order feasibility determination, credit authorization, order issuance, order status and tracking, customer update on order activities and customer notification on order completion</li> </ul>
	Service Configuration and Activation	<ul style="list-style-type: none"> <li>Service Configuration and Activation processes are responsible for the design, installation and configuration of the service / solution for customers</li> </ul>
	Resource Provisioning	<ul style="list-style-type: none"> <li>Resource Provisioning processes encompass allocation, installation, configuration, activation and testing of specific resources to meet the service requirements, or in response to requests from other processes to alleviate specific resource capacity shortfalls, availability concerns or failure conditions.</li> </ul>
Assurance		<ul style="list-style-type: none"> <li>Group of processes responsible for the execution of both proactive and reactive maintenance activities to ensure continuous service operation and according to the offered SLA/QoS performance levels</li> <li>Includes things like customer interface management, problem handling, customer QoS/SLA management</li> </ul>
	Problem Handling	<ul style="list-style-type: none"> <li>Responsible for receiving trouble reports from customers, resolving them to the customer’s satisfaction and providing meaningful status on repair and/or restoration activity to the customer.</li> </ul>
	Customer QoS/SLA Management	<ul style="list-style-type: none"> <li>Monitoring, managing and reporting of delivered versus contractual Quality of Service (QoS), as defined in the enterprise’s service descriptions, customer contracts or product catalogue.</li> </ul>
	Service Problem Management	<ul style="list-style-type: none"> <li>Respond immediately to customer-affecting service problems or failures in order to minimize their effects on customers, and to invoke the restoration of the service, or provide an alternate service as soon as possible.</li> </ul>
	Service Quality Management	<ul style="list-style-type: none"> <li>Encompasses monitoring, analysing and controlling the performance of the service perceived by customers.</li> </ul>
Common	Customer Interaction Management	<ul style="list-style-type: none"> <li>Manage interactions between the customer and the enterprise. Interactions can be triggered by the customer (as a result of customer query or complaint) or by the enterprise (for example sending bills or other customer notifications.) All customer interactions are logged by the enterprise in order to provide a full track record of customer activity to the enterprise representatives.</li> </ul>

## Cartesian: CEI Service Delivery Process Equivalence Options

eTOM – Level 1	eTOM – Level 2	Description
	<b>Customer Information Management</b>	<ul style="list-style-type: none"> <li>Manage customer information after customer contracts or associated service orders have been finalized and during the order completion phase. Ensure that any customer information required by other CRM processes is updated as part of the customer order completion.</li> </ul>

We also used the TM Forum Application (TAM) framework to identify the impacted applications. Note that the business processes identified above determine which application functionalities are required to support them.

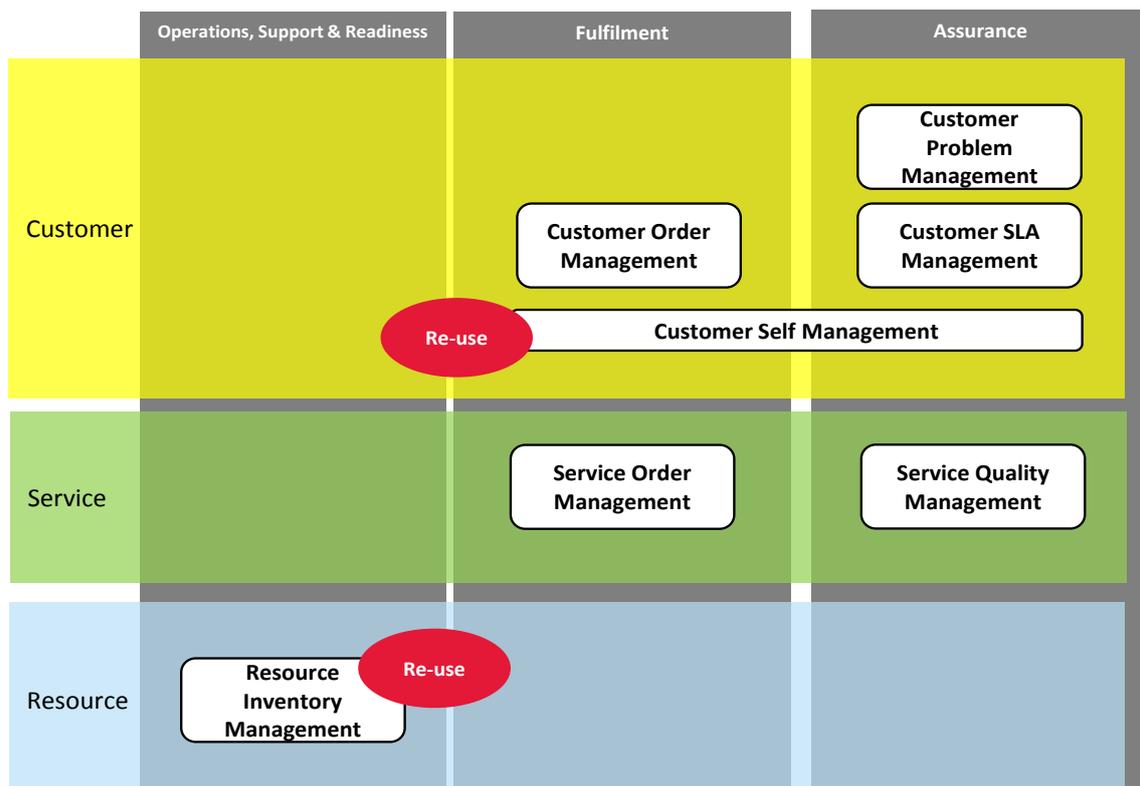
From our research, we understand that many of the CEI processes are currently not automated. Eircom is using manual business processes rather than software applications for these products.

In considering the changes that would be required for the potential options identified in Sections 5 and 6, we focused on the most critical applications:

- **Customer Self-Management:** re-use/expand the existing customer portal (Universal Gateway) to support the new services identified for these products
- **Resource Inventory Management:** re-use / expand existing system capabilities

Eircom does not appear to use software applications for **Customer Order Management**, **Customer SLA/QoS**, **Customer SQM** and **Problem Management** for the CEI products. We have not included changes / addition of these applications in the impact assessment.

**Figure 28. High-Level Representation of the TAM Framework, highlighting the potentially impacted applications (illustrative)**



## Cartesian: CEI Service Delivery Process Equivalence Options

The applications to support the fulfilment and assurance business processes are shown in the table below. The descriptions below are sourced from the TM Forum’s TAM framework and are included for ease of reference.

**Figure 29. Description of the Impacted Applications as defined by the TAM Framework**

TAM – Level 0	TAM – Level 1	Description
Customer Management Domain	Customer Self-Management	<ul style="list-style-type: none"> <li>Customer self-empowered applications provide an internet technology driven interface to the customer to undertake a variety of business functions directly for themselves. These applications interact to provide fully automated service or assisted service over various customer touch points.</li> </ul>
Resource Management Domain	Resource Inventory Management	<ul style="list-style-type: none"> <li>Resource Inventory applications manage information of all resources used to implement services and products. This application area is typically linked to various element management systems (i.e. building inventory for actual server, applications, network and resource assets) and resource inventory database systems which may or may not be combined with Service Inventory Application(s) or database(s).</li> </ul>

## 7.2 Impacted Processes and Applications for Duct Access EOO Enhancements

### 7.2.1 Impact Assessment

For each of the potential options identified in Section 5.1 for enhancing the Duct Access product, we assessed which of the processes and applications would be impacted. The results are shown in the table below.

Figure 30. Impact Assessment of the identified options for duct product

		Potential Option	eTOM								TAM	
			Order Handling	Service Configuration and Activation	Resource Provisioning	Problem Handling	Service Problem Management	Customer QoS/SLA Management	Service Quality Management	Customer Interaction Management	Customer Information Management	Customer Self-Management
Pre-ordering – Desktop Survey	A DS.1	Reduce maximum permitted time for the desktop survey (SLA)					✓	✓				
	A DS.2	Define the maximum number of multiple point-to-point and point-to-multi point routes per OAO request (and update respective SLAs)					✓	✓				
	A DS.5	Reduce maximum permitted time for acknowledging receipt of request (SLA)					✓	✓				
	B DS.1	Provide duct structural and capacity information upfront to OAOs [inc. duct usage which should be stored in the main inventory system]	✓		✓						✓	✓
	B DS.2	Allow OAO to conduct the desktop survey instead of Eircom [dependency on B DS.1]	✓						✓	✓	✓	
	A B DS.3	Document how duct availability information is captured, stored and maintained							✓			
	A B DS.4	Require Eircom to report on the monthly KPIs defined in the KPI section for this stage, segmenting internal and external requests					✓	✓				
Pre-Ordering – Field Survey	DF.1	Allow OAO to conduct the field survey activity (using approved contractors)	✓						✓	✓		
	DF.2	Require Eircom to fully document the procedure to be followed during field survey and make it available to OAOs together with current engineering rules							✓			
	DF.3	Use the results of the field survey to update the existing duct usage information/records	✓		✓							
	DF.4	Require Eircom to report on the monthly KPIs defined in the KPI section for this stage, segmenting internal and external requests					✓	✓				
	DF.5	Reduce maximum permitted time for acknowledging receipt of request (SLA)					✓	✓				
	DF.6	Reduce maximum permitted time for field survey (SLA) conducted by Eircom					✓	✓				

**Cartesian: CEI Service Delivery Process Equivalence Options**

			eTOM								TAM		
		Potential Option	Order Handling	Service Configuration and Activation	Resource Provisioning	Problem Handling	Service Problem Management	Customer QoS/SLA Management	Service Quality Management	Customer Interaction Management	Customer Information Management	Customer Self-Management	Resource Inventory Management
Sub-Duct Design	DD.1	Allow OAO to conduct the RRT and to do it during the field survey (previous stage) if route not available by chamber inspection (any route blockage to be communicated back to Eircom – assess and provide price quote)	✓							✓	✓		
	DD.2	Require Eircom to record and report on the monthly KPIs (defined in the KPI section for this stage), segmenting internal and external requests						✓	✓				
Ordering	DO.1	Allow the OAO to install the sub-duct and the cable together (optional)	✓							✓	✓		
	DO.2	Sub-duct information (as per design) to be recorded in the inventory system for all orders (including sub-duct reservation orders) – i.e., inventory modelling		✓	✓								✓
	DO.3	Reduce the maximum permitted time for provisioning of sub-duct reservation (SLA)						✓	✓				
	DO.4	Reduce time for acknowledging receipt of request for duct reservation						✓	✓				
	DO.5	Allow OAO to supply own sub-duct for the interconnection duct (optional)	✓							✓	✓		
	DO.6	List of documents to be submitted by OAO for installation of interconnection sub-duct to be fully defined by Eircom	✓							✓			
	DO.7	Reduce maximum permitted time for provisioning in-situ sub-duct (SLA)						✓	✓				
	DO.8	Reduce maximum permitted time for sub-duct installation (if Eircom doing it)						✓	✓				
	DO.9	Define new SLA to cope the delivery of the sub-duct for the interconnection (when supplied by Eircom)						✓	✓				
	DO.10	Define SLA for emergency CoW requests during OAO installation				✓	✓	✓	✓				
	DO.11	Require Eircom to record and report on monthly KPIs (defined in KPI section for this stage), segmenting internal and external requests						✓	✓				

## Cartesian: CEI Service Delivery Process Equivalence Options

		eTOM								TAM		
Potential Option		Order Handling	Service Configuration and Activation	Resource Provisioning	Problem Handling	Service Problem Management	Customer QoS/SLA Management	Service Quality Management	Customer Interaction Management	Customer Information Management	Customer Self-Management	Resource Inventory Management
Assurance	DA.1	Enable in situ repair of damaged cables by providing OAO access to intermediate chambers, enabling break-out of cables from sub-ducts in those chambers, and allowing co-location of OAO joint boxes in those chambers (subject to survey)			✓	✓	✓			✓	✓	
	DA.2	Define types of minor faults and assign priority levels for resolution (and update existing SLA)					✓	✓				
	DA.3	Include a maximum permitted time for fault repair by Eircom (SLA)					✓	✓				
	DA.4	Reduce maximum permitted time to respond after receipt of fault repair and planned /unplanned maintenance requests				✓	✓	✓	✓			
	DA.5	Fault reporting should go via a dedicated technical team and not via the wholesale account manager (minor faults or unplanned maintenance requests)				✓	✓			✓	✓	
	DA.6	Reduce maximum permitted time for Eircom to provide OAO with a date for the supervised access when required/requested					✓	✓	✓			
	DA.7	Require Eircom to record and report on the monthly KPIs (defined in the KPI section for this stage), segmenting internal and external requests						✓	✓			

7.2.2 Description of Impacts

The mapping of process impacts in Figure 31 revealed impacts to nine business processes from the eTOM framework. The table below provides a description of the impacts for each of the processes.

**Figure 31. Description of the Impact of the Duct EOO Improvement Options (from a process perspective)**

	Processes	Description of Impacts
Fulfilment Processes	Order Handling	<ul style="list-style-type: none"> <li>This process is impacted by 8 potential options across the different stages of the fulfilment process</li> <li>It needs to be updated for capturing and managing the new/revised order requests; new documentation and training are required as well as the development of new/revised order forms to address the changes in the process</li> </ul>
	Service Configuration and Activation	<ul style="list-style-type: none"> <li>This process is impacted by 1 option in the ordering stage</li> <li>It requires the process to be updated for defining how/what information in the inventory is changed to active/configure the product being provided e.g. duct reservation order, installation order</li> </ul>
	Resource Provisioning	<ul style="list-style-type: none"> <li>This process is impacted by 4 potential options</li> <li>It requires the process to be updated for defining how duct usage data will be captured/defined, stored, maintained and shared (automated); changes to existing records during assurance activities should be also captured</li> </ul>
Assurance Processes	Problem Handling	<ul style="list-style-type: none"> <li>This process is impacted by 4 potential options in the fault management stage</li> <li>It requires the definition of new problem management processes for the dedicated team to follow; the current problem handling process to be updated accordingly to the new/revised SLAs as well as to the change on the damage repair process;</li> </ul>
	Service Problem Management	<ul style="list-style-type: none"> <li>This process is impacted by 5 potential options in the fault management stage</li> <li>It requires new processes to be defined to respond immediately to customer-affecting problems</li> </ul>
	Customer QoS/SLA Management	<ul style="list-style-type: none"> <li>This process is impacted by 20 potential options across the different stages of the fulfilment and assurance processes (same options impacting SQM)</li> <li>It requires the process to be updated for coping with the new/revised SLAs; update the customer reports on delivered versus contracted SLAs</li> </ul>
	Service Quality Management (SQM)	<ul style="list-style-type: none"> <li>This process is impacted by 20 potential options across the different stages of the fulfilment and assurance processes</li> <li>It requires the process to be updated to cope with the new/revised SLAs. New processes need to be defined to capture, store and maintain the data related to the identified KPIs</li> </ul>
Common to Fulfilment and Assurance Processes	Customer Interaction Management	<ul style="list-style-type: none"> <li>These two processes are impacted by the 10 and 7 (subset of the 10) potential options respectively across the different stages of the fulfilment and assurance</li> <li>The customer interaction is impacted by the more self-service approach allowed where the OAO is provided with all the relevant data to conducting the desktop and field surveys as well as the RRT and installation of sub-duct</li> <li>All the requests for duct information and the actions carried by the OAO must be recorded for audit and billing purposes (impacted 7 potential options)</li> </ul>
	Customer Information Management	

**Note:** one potential option can impact one or more processes and therefore the sum of the potential options impacting the processes may be equal or greater than the total number of potential options identified

## Cartesian: CEI Service Delivery Process Equivalence Options

From an application perspective, there are two applications of the TAM framework being impacted. The table below provides a description of the impacts for each application.

**Figure 32. Description of the Impact of the Duct EOO Improvement Options (from an application perspective)**

	Application	Description of Impacts
Customer Domain	Customer Self-management	<ul style="list-style-type: none"> <li>• This application is impacted by 2 options from the desktop survey stage</li> <li>• It requires the development of an online tool to provide duct related information (structural and usage) and thus allow the OAO to conduct its own desktop survey (electronic data requests)</li> <li>• Applications needs:               <ul style="list-style-type: none"> <li>○ to load detailed duct info (location and usage) from inventory and display it</li> <li>○ Allow electronic data request automatic request delivery</li> </ul> </li> </ul>
Resource Domain	Resource Inventory Management	<ul style="list-style-type: none"> <li>• This application is impacted by 2 options in the desktop survey and ordering stage</li> <li>• It requires some system development to:               <ul style="list-style-type: none"> <li>○ Extend the system capability to capture, store and maintain information related to the duct capacity usage</li> <li>○ Capture data from the inventory system storing Eircom's cable info to determine the current duct usage. It will capture all the sub-duct requests (from all OAOs) and use such information to determine the usage as well</li> </ul> </li> </ul>

As noted above, the following functionalities are implemented as paper-based business processes rather than software applications: Customer order management, customer SLA/QoS management, customer problem management and service quality management. The required changes in these domains are implemented in the business processes.

### 7.3 Impacted Processes and Applications for Pole Access EOO Enhancements

#### 7.3.1 Impact Assessment

For each of the potential options identified in Section 5.2 for enhancing the Pole Access product, we assessed which of the processes and applications would be impacted. The results are shown in the table below.

Figure 33. Impact Assessment of the Identified Options for Pole Product

			eTOM								TAM		
		Potential Option	Order Handling	Service Configuration and Activation	Resource Provisioning	Problem Handling	Service Problem Management	Customer QoS/SLA Management	Service Quality Management	Customer Interaction Management	Customer Information Management	Customer Self-Management	Resource Inventory Management
OAO Survey	PS.1	Replace the desktop estimate service by a discrete pricing list (per unit of cost) to be included in the published documentation								✓	✓		
	PS.2	Record pole inventory/structural and capacity usage information in a physical inventory system			✓								✓
	PS.3	Make available pole usage information upfront to OAOs during OAO survey phase [in addition to the pole inventory/structural]	✓		✓							✓	
	PS.4	Define the OAO Survey format upfront and include the full details in the published documentation								✓			
	PS.5	Reduce maximum permitted time for acknowledging receipt of request (SLA)						✓	✓				
	PS.6	Require Eircom to record and report on the monthly KPIs (defined in the KPI section for this stage), segmenting internal and external requests						✓	✓				
Eircom Design	PD.1	Reduce maximum permitted time for the provision of a pole route design plan (SLA)						✓	✓				
	PD.2	Record the output of the network design activity in the inventory system		✓	✓								✓
	PD.3	Require Eircom to record and report on the monthly KPIs (defined in the KPI section for this stage), segmenting internal and external requests						✓	✓				
Pole Ordering	PO.1	Make Eircom responsible for preparing the route (if required) for OAO to install the cables independently of the size of the order request	✓							✓			
	PO.2	Reduce maximum permitted time for route preparation (SLA)						✓	✓				
	PO.3	Require Eircom to start route preparation if OAO raises the need for it as part of the survey	✓							✓	✓		
	PO.4	Record the changes resulting from the route preparation activity in the inventory system			✓								✓
	PO.5	Define new SLA for emergency help and request of CoW during OAO cable installation				✓	✓	✓	✓				
	PO.6	Store pole furniture requests in the inventory system as a record of pole usage		✓	✓								✓

## Cartesian: CEI Service Delivery Process Equivalence Options

	Potential Option	eTOM								TAM		
		Order Handling	Service Configuration and Activation	Resource Provisioning	Problem Handling	Service Problem Management	Customer QoS/SLA Management	Service Quality Management	Customer Interaction Management	Customer Information Management	Customer Self-Management	Resource Inventory Management
	PO.7	Additional pole furniture request to go together with the OAO survey	✓									
	PO.8	Reduce maximum permitted time for pole reservation					✓	✓				
	PO.9	Store route reservation orders in the inventory system [dependency on PS.2]			✓							✓
	PO.10	Require Eircom to record and report on the monthly KPIs (defined in the KPI section for this stage), segmenting internal and external requests					✓	✓				
Pole Assurance	PA.1	Conduct the planned maintenance activity on poles and aerial routes without need to involve the OAO (for removing their cables for example)							✓			
	PA.2	Make OAO responsible for requesting the necessary consent permission for cable repair (when OAO is repairing the cable)			✓				✓			
	PA.3	Define minimum permitted time to notify the OAOs in case of unplanned maintenance activity (new SLA)					✓	✓				
	PA.4	Define types of minor faults and assign priority levels for resolution (and update existing SLA)				✓						
	PA.5	Include a maximum permitted time for fault repair by Eircom (SLA)					✓	✓				
	PA.6	Reduce maximum permitted time to respond after receipt of fault repair and planned /unplanned maintenance requests					✓	✓				
	PA.7	Fault reporting should go via a dedicated technical team (minor faults or unplanned maintenance requests)				✓	✓		✓	✓		
	PA.8	Require Eircom to record and report on the monthly KPIs (defined in the KPI section for this stage), segmenting internal and external requests						✓	✓			

**Note:** one potential option can impact one or more processes and therefore the sum of the potential options impacting the processes may be equal or greater than the total number of potential options identified

7.3.2 Description of Impacts

The mapping of process impacts in Figure 33 revealed impacts to nine business processes from the eTOM framework. The table below provides a description of the impacts for each of the processes.

**Figure 34. Description of the Impact of the Pole EOO Improvement Options (from a process perspective)**

	Processes	Description of Impacts
Fulfilment Processes	Order Handling	<ul style="list-style-type: none"> <li>This process is impacted by 4 potential options in desktop survey and ordering stages</li> <li>It requires the current process to be updated to capture and manage the new order request details; it also requires new/revised order forms to address the changes in the process</li> </ul>
	Service Configuration and Activation	<ul style="list-style-type: none"> <li>This process is impacted by 2 potential options</li> <li>It requires the process to be updated for defining how/what information in the inventory is changed to active/configure the product being provided e.g. pole reservation order, installation order; new designs and configuration specs to record of the pole information in the inventory system</li> </ul>
	Resource Provisioning	<ul style="list-style-type: none"> <li>This process is impacted by 6 potential options across survey, design and ordering stages</li> <li>It requires the process to be updated defining how data re. to pole usage will be captured, stored, maintained and shared (automated)</li> </ul>
Assurance Processes	Problem Handling	<ul style="list-style-type: none"> <li>This process is impacted by 3 potential option in the fault management stage</li> <li>It requires the definition of the new problem management processes for the dedicated team to follow; the new/revised SLAs also require the current problem handling process to be updated accordingly</li> </ul>
	Service Problem Management	<ul style="list-style-type: none"> <li>This process is impacted by 3 potential options in the ordering and assurance stages</li> <li>It requires new processes to be defined to respond immediately to customer-affecting problems</li> </ul>
	Customer QoS/SLA Management	<ul style="list-style-type: none"> <li>This process is impacted by 12 options across fulfilment and assurance stages</li> <li>It requires the process to be updated to cope with the new/revised SLAs; update the customer reports on delivered versus contracted SLAs</li> </ul>
	Service Quality Management	<ul style="list-style-type: none"> <li>This process is impacted by 12 options across fulfilment and assurance stages</li> <li>It requires the process to be updated to cope with the new/revised SLAs. New processes are also needed to capture, store and maintain the identified KPIs</li> </ul>
Common to Fulfilment and Assurance Processes	Customer Interaction Management	<ul style="list-style-type: none"> <li>This process is impacted by the 7 potential options in the survey and assurance stages</li> <li>The customer interaction is impacted by the new upfront data shared with the OAO for conducting the survey; also the interaction during assurance is impacted with new roles and responsibilities being assigned to OAO and Eircom</li> </ul>
	Customer Information Management	<ul style="list-style-type: none"> <li>This process is impacted by the 3 potential options across the different stages of the fulfilment and assurance</li> <li>Additional customer information due to the type of interaction with customer support teams should be recorded for audit and billing purposes</li> </ul>

## Cartesian: CEI Service Delivery Process Equivalence Options

**Note:** one potential option can impact one or more processes and therefore the sum of the potential options impacting the processes may be equal or greater than the total number of potential options identified

From an application perspective, there are two applications in the TAM framework that are impacted. The table below provides a description of the impacts for each impacted application.

**Figure 35. Description of the Impact of the Pole EOO Improvement Options (from an application perspective)**

	Application	Description of Impacts
Customer Domain	Customer Self-management	<ul style="list-style-type: none"> <li>• This application is impacted by 1 potential options in the OAO survey stage</li> <li>• It requires the development of an online tool to provide pole related information (structural and usage) in a dynamic and interactive way, reducing the volume of field surveys (electronic data requests)</li> <li>• It requires some system development to:               <ul style="list-style-type: none"> <li>– to load detailed and up to date pole info (location and usage) from inventory and display it</li> <li>– Allow electronic data request automatic request delivery</li> </ul> </li> </ul>
Resource Domain	Resource Inventory Management	<ul style="list-style-type: none"> <li>• This application is impacted by 5 potential options in the survey, design and ordering stages</li> <li>• It requires some system development to:               <ul style="list-style-type: none"> <li>– Extend the system capability to capture, store and maintain information related to the pole structural and capacity usage information</li> <li>– Link to the inventory system storing Eircom’s cable info and the logical inventory to capture all the necessary data to determine the current pole usage</li> <li>– Store pole furniture information and use it to determine the pole capacity usage as well</li> </ul> </li> </ul>

As noted above, the following functionalities are implemented as paper-based business processes rather than software applications: Customer order management, customer SLA/QoS management, customer problem management and service quality management. The required changes in these domains are implemented in the business processes.

### 7.4 Impacted Processes and Applications for Transition to EOI Model

We followed the same process to identify additional impacts for transitioning to an EOI service delivery model. The impacts are common to both duct and pole access. These impacts are incremental to those already identified for the enhancements to the EOO model for Duct and Pole Access.

#### 7.4.1 Impact Assessment

The table below shows the impact assessment conducted for the process and application changes given the identified options for EOI transition.

**Figure 36. Impact Assessment for the Process and Application Changes given the identified options for EOI Transition**

	Potential Option	eTOM									TAM	
		Order Handling	Service Configuration and Activation	Resource Provisioning	Problem Handling	Service Problem Management	Customer QoS/SLA Management	Service Quality Management	Customer Interaction Management	Customer Information Management	Customer Self-Management	Resource Inventory Management
DE.1	Use of the same data sources supporting the survey activities to ensure equal access to network data			✓								✓
DE.2	Use of the same systems for storing any network related data (e.g. from surveys and post-installation activities) and deriving accurate usage levels			✓								✓
DE.3	Use of the same order forms and the same order request channels	✓			✓				✓			
DE.4	Use of the same SLAs	✓				✓	✓					
DE.5	Use of the same fulfilment and assurance processes	✓			✓				✓			
DE.6	The definition and implementation of a Data Governance Model	✓		✓	✓	✓	✓					
DE.7	Use of KPIs to help monitoring the processes performance and SLA breaches						✓					

As previously noted, the following functionalities are implemented as paper-based business processes rather than software applications: Customer order management, customer SLA/QoS management, customer problem management and service quality management. The required changes in these domains are implemented in the business processes.

## Cartesian: CEI Service Delivery Process Equivalence Options

### 7.4.2 Description of Impacts

We identified impacts to nine business processes from the eTOM framework. The table below provides a description of the impacts for each of the processes.

	Processes	Description of Impacts
Fulfilment Processes	Order Handling	<ul style="list-style-type: none"> <li>This process is impacted by 4 potential options</li> <li>Needs to enforce the same orders forms and same order request channels are in place for internal customers</li> </ul>
	Service Configuration and Activation	<ul style="list-style-type: none"> <li>Impact covered by assessment of EOO options</li> <li>This process is not impacted by any of the additional options for EOI transition</li> </ul>
	Resource Provisioning	<ul style="list-style-type: none"> <li>This process is impacted by 3 potential options</li> <li>Needs to ensure the new data governance model is implemented to guarantee equal access to network data</li> </ul>
Assurance Processes	Problem Handling	<ul style="list-style-type: none"> <li>This process is impacted by 3 potential options</li> <li>Needs to enforce the internal customers follow the same functional assurance framework</li> </ul>
	Service Problem Management	<ul style="list-style-type: none"> <li>This process is impacted by 2 potential options</li> <li>Needs to enforce the internal customers follow the same functional assurance framework</li> </ul>
	Customer QoS/SLA Management	<ul style="list-style-type: none"> <li>This process is impacted by 3 potential options</li> <li>Needs to enforce the same SLAs, timelines and penalties are applied for internal customers</li> </ul>
	Service Quality Management	<ul style="list-style-type: none"> <li>Impact covered by assessment of EOO options</li> <li>This process is not impacted by any of the additional options for EOI transition</li> </ul>
Common to Fulfilment and Assurance Processes	Customer Interaction Management	<ul style="list-style-type: none"> <li>This process is impacted by 2 potential options</li> <li>Needs to re-define the interaction between Eircom and the internal customers</li> </ul>
	Customer Information Management	<ul style="list-style-type: none"> <li>Impact covered by assessment of EOO options</li> <li>This process is not impacted by any of the additional options for EOI transition</li> </ul>

From an application perspective, there are two applications in the TAM framework that are impacted. The table below provides a description of the impacts for each impacted application.

**Figure 37. Description of the Impact of the EOI Transition Options (from an application perspective)**

	Application	Description of Impacts
Customer Domain	Customer Self-management	<ul style="list-style-type: none"> <li>Impact covered by assessment of EOO options</li> <li>This application is not impacted by any of the additional options for EOI transition</li> </ul>

## Cartesian: CEI Service Delivery Process Equivalence Options

	Application	Description of Impacts
Resource Domain	Resource Inventory Management	<ul style="list-style-type: none"> <li>This application is impacted by two options</li> <li>It requires some additional system development work to that captured by the EOO options: <ul style="list-style-type: none"> <li>Ensure all network data related with duct and pole is stored in the same inventory system</li> <li>Ensure the same data in this system is used to support all the OAO (inc. Eircom) activities during the fulfilment process</li> <li>Ensure the data governance model is implemented from a system application perspective</li> </ul> </li> </ul>

### 7.5 Time and Cost Estimates

In this section, we present estimates of the time and cost required to implement the potential options.

The impact assessment carried out allows for a clear identification of the necessary process and system changes to either enhance the current EOO CEI service delivery model or transition to an EOI CEI service delivery model. However, it is important to recognise that these estimates were developed externally to Eircom. Cartesian did not seek input from Eircom in developing the assumptions and our estimates have not been validated by Eircom. As such, the estimates should be viewed as directionally correct rather than absolute.

#### 7.5.1 Input Assumptions

We have used the following assumptions to support our time and cost estimate. The estimates of development effort are based on Cartesian's experience in supporting service providers in business change projects.

**Figure 38. Quantitative Assumptions used in Cost Estimation**

Item	Value	Source
<b>Development Costs</b>		
Requirement Gathering	1 – 2 weeks of effort	Cartesian assumption
Solution Design	6 – 8 weeks of effort	Cartesian assumption
Implementation	6 – 8 weeks of effort	Cartesian assumption
Testing	3 – 4 weeks of effort	Cartesian assumption
Project Management	10% of development costs	Cartesian assumption
Contingency	20% of development costs	Cartesian assumption
Cost of IT Developer	€550 per day	Cartesian assumption based on market rates
<b>Staff Training Costs</b>		
Training Cost	€250 per day	Cartesian assumption

## Cartesian: CEI Service Delivery Process Equivalence Options

Number of staff to be trained	10	Cartesian assumption based on 3 technical support staff, 3 order handling staff, 2 network designers and 2 product managers
<b>Ongoing Operational Costs</b>		
Software maintenance costs	20% of total capex	Cartesian assumption

In developing the cost estimates, we have followed a set of guiding principles as follows:

- The application development process consists of the following high-level activities:
  - requirement gathering, IT solution design, implementation, testing and launching
- The business process development process consists of the following high-level activities
  - requirement gathering, process design, documentation, testing and training
- Testing for processes and applications are carried out together and accounted for under the business processes.
- Synergies are assumed for the development of the customer portal and the business processes around the assurance operations as they span both products; costs are split 50-50 among the two products.
- The new customer portal interface for these products will use the same physical server infrastructure in place today for supporting Eircom’s universal gateway portal.

Changes to operational costs for service delivery activities and service assurance are beyond the scope of this assessment, for example a potential reduction in field activities as a result of having better information available at the desk survey stage.

The assessment does not include any incremental software licence costs which may be required, e.g. to enable additional functionality in Eircom’s existing inventory management system.

### 7.5.2 Enhancements to the existing EOO Delivery Model

We estimate that to implement the potential options for enhancing the existing EOO Duct and Pole products would require a team of five people, including one project manager, for approximately 27 to 33 weeks. The indicative costs to implement these options are in the range of €302k – €362k plus licence costs. This covers the costs for system and business process development. The major cost driver is the required process development work. The training costs are accounted separately and are approximately €62,500. Inclusive of training, the overall costs are in the range of €365 – €425k plus licence costs.

## Cartesian: CEI Service Delivery Process Equivalence Options

A break-down of the costs is presented in the table below.

**Figure 39. EOO Improvement Options for Duct and Pole – Time and Cost Estimate Summary**

Impacted Applications and Processes		Time (man-days)	Indicative CAPEX (approx.)
Applications	Customer Self-management*	65	€35,750
	Resource Inventory Management	120	€66,000
	Project Management*	11	€5,100
	Hardware	/	/
Sub-Total		<b>196</b>	<b>€106,840</b>
Fulfilment Processes	Order Handling	85	€46,750
	Service Configuration and Activation	35	€19,250
	Resource Provisioning	63	€34,375
Assurance Processes	Problem Handling*	23	€12,375
	Customer QoS/SLA Management*	23	€12,375
	Service Problem Management*	23	€12,375
	Service Quality Management*	23	€12,375
Common to Fulfilment and Assurance Processes	Customer Interaction Management	35	€19,250
	Customer Information Management	30	€16,500
	Project Management*	18	€9,280
Sub-Total		<b>355</b>	<b>€194,910</b>
Total Development		<b>551</b>	<b>€301,740</b>
Total Development (inc. 20% contingency)		<b>661</b>	<b>€362,100</b>
Training		<b>25</b>	<b>€62,500</b>

\* Activities that are common to both duct and pole products

Based on an assumed software maintenance rate of 20% of upfront capex, the resulting annual operational cost is approximately €60k – €72k.

We have also estimated the cost of implementing either the Duct product enhancements or the Pole product enhancements on a standalone basis. As noted in the assumptions, the cost estimate assumes that a number of activities are common to both the duct and pole products, hence the sum of these individual programmes is more than the total for doing both.

To enhance only the Duct product would take approximately 17 to 21 weeks, with total costs in the range of €234k – €272k (including training).

To enhance only the Pole product would take approximately 18 to 22 weeks, with total costs in the range of €244 – €285k (including training).

A more granular break-down of the costs can be found in Appendix 8.1.

## Cartesian: CEI Service Delivery Process Equivalence Options

### 7.5.3 Transition to an EOI Delivery Model

Our impact assessment for transitioning to an EOI delivery model is incremental to the changes assessed above for improving the current EOO delivery model.

We estimate that to implement the potential options for transitioning the processes and systems of the Duct and Pole products to an EOI delivery model would require incremental development effort with team of five people, including one project manager, for approximately 8 to 10 weeks. The indicative costs for implementing these options are in the range of €91k – €109k, incremental to the EOO costs. The training costs are accounted separately and are approximately €19,000. Inclusive of training, the incremental costs are in the range of €100k – €118k.

The combined cost of systems and processes for EOI would therefore be in the range of €465,000 to €543,000.

If Eircom were to transition to EOI without making the potential improvements identified for the EOO approach, then the system and process costs would be expected to be similar or less than the combined cost range of €465,000 to €543,000.

A break-down of the costs is presented in the table below.

**Figure 40. EOI Service Delivery – Time and Cost Estimate Summary**

Impacted Applications and Processes		Time (man-days)	Indicative CAPEX (approx.)
Applications	Customer Self-management	0	€ 0.00
	Resource Inventory Management	50	€ 27,500
	Project Management	5	€ 2,750
	Hardware	/	/
	SW Licences	/	Not included
Sub-Total		<b>55</b>	<b>€ 30,250</b>
Fulfilment Processes	Order Handling	22	€ 11,000
	Service Configuration and Activation	0	€ 0,0
	Resource Provisioning	32	€ 16,500
Assurance Processes	Problem Handling	14	€ 6,875
	Customer QoS/SLA Management	14	€ 6,875
	Service Problem Management	14	€ 6,875
	Service Quality Management	0	€ 0,0
Common to Fulfilment and Assurance Processes	Customer Interaction Management	3	€ 6,875
	Customer Information Management	0	€ 0,0
	Project Management	11	€ 5,500
Sub-Total		<b>121</b>	<b>€ 60,500</b>
Total Development		<b>176</b>	<b>€ 90,750</b>

## Cartesian: CEI Service Delivery Process Equivalence Options

Impacted Applications and Processes	Time (man-days)	Indicative CAPEX (approx.)
Total Development (inc. 20% contingency)	212	€ 108,900
Training	8	€ 18,750

From an application perspective, the required changes are on the inventory system to guarantee network data is stored in the same place for internal and external customers.

From a process perspective, the major changes are for the internal customers who will need to follow new processes. Given this will be an adaptation of the processes defined under EOO, we assumed approximately half the effort for developing them.

Based on an assumed software maintenance rate of 20% of upfront capex, the resulting annual operational cost is approximately €18,000.

## 8. Appendix

### 8.1 Auxiliary Calculations for Impact Assessment

Below we present a break-down of the cost and time estimates summarised in Section 7 for each CEI product and delivery model.

#### 8.1.1 Estimates for Duct Product under EOO

To enhance only the Duct product would take approximately 17 to 21 weeks, with total costs in the range of €234k-272k (including training).

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#### ***Title of Table***

Impacted Applications and Processes		Time (man-days)	Indicative CAPEX (approx.)
Applications	Customer Self-management*	65	€ 35,750
	Resource Inventory Management	50	€ 27,500
	Project Management	7	€ 3,200
	Hardware	/	/
	SW Licences	/	Not included
Sub-Total		<b>122</b>	<b>€ 66,400</b>
Fulfilment Processes	Order Handling	48	€ 26,125
	Service Configuration and Activation	18	€ 9,625
	Resource Provisioning	28	€ 15,125
Assurance Processes	Problem Handling*	23	€ 12,375
	Customer QoS/SLA Management*	23	€ 12,375
	Service Problem Management*	23	€ 12,375
	Service Quality Management*	23	€ 12,375
Common to Fulfilment and Assurance Processes	Customer Interaction Management	18	€ 9,625
	Customer Information Management	15	€ 8,250
	Project Management	12	€ 5,900
Sub-Total		<b>227</b>	<b>€ 124,160</b>
Total Development		<b>349</b>	<b>€ 190,580</b>
Total Development (inc. 20% contingency)		<b>417</b>	<b>€ 228,690</b>
Training		<b>18</b>	<b>€ 43,750</b>

## Cartesian: CEI Service Delivery Process Equivalence Options

### Observations

- The time and costs for allocated to the customer self-management application need to be considered under the pole product (€35,750) if options A for the desktop survey phase are selected.
- We estimate a 20% rate to cover the on-going annual maintenance cost, resulting in approximately €38k – 46k.

### 8.1.2 Estimates for Pole Product under EOO

To enhance only the Pole product would take approximately 18 to 22 weeks, with total costs in the range of €244-285k (including training).

**Figure 41. Pole EOO Improvement Options– Time and Cost Estimate Summary**

Impacted Applications and Processes		Time (man-days)	Indicative CAPEX (approx.)
Applications	Customer Self-management*	65	€ 35,750
	Resource Inventory Management	70	€ 38,500
	Project Management	8	€ 3,710
	Hardware	/	/
	SW Licences	/	Not included
Sub-Total		<b>143</b>	<b>€ 77,960</b>
Fulfilment Processes	Order Handling	38	€ 20,625
	Service Configuration and Activation	18	€ 9,625
	Resource Provisioning	35	€ 19,250
Assurance Processes	Problem Handling*	23	€ 12,375
	Customer QoS/SLA Management*	23	€ 12,375
	Service Problem Management*	23	€ 12,375
	Service Quality Management*	23	€ 12,375
Common to Fulfilment and Assurance Processes	Customer Interaction Management	18	€ 9,625
	Customer Information Management	15	€ 8,250
	Project Management	12	€ 5,840
Sub-Total		<b>224</b>	<b>€ 96,730</b>
Total Development		<b>367</b>	<b>€ 200,680</b>
Total Development (inc. 20% contingency)		<b>440</b>	<b>€ 240,820</b>
Training		<b>18</b>	<b>€ 43,750</b>

### Observations

- The development costs for expanding the inventory system capabilities are higher than in the duct product because it requires more changes in the resource inventory

## Cartesian: CEI Service Delivery Process Equivalence Options

- The cost for implementing the process changes are lower than in the duct product given there are slightly less changes in the order handling process
- We estimate a 20% rate to cover the on-going annual maintenance cost, resulting in approximately €40k – 48k.

### 8.2 International Case Studies

To help identify potential options for enhancing the CEI products in Ireland, Cartesian developed case studies of these products in three other countries: France, Portugal and the UK.

The research was conducted in April/May 2016 and relied primarily on publically available documentation with selected primary research to address specific gaps. Of the three countries studied, Portugal had the most information available in the public domain which is reflected in the longer case study for this country.

#### 8.2.1 France

##### **Overview**

Orange, formerly known as France Télécom, is the largest fixed-line operator in France. Orange owns over 350,000 km of ducts<sup>35</sup> and an extensive nationwide network of around 13 million aerial poles.<sup>36</sup>

Orange first offered non-regulated duct access in December 2007, and in July 2008 the French telecoms regulator ARCEP imposed duct access obligation, following the analysis of Market 4 (Wholesale network infrastructure access at a fixed location).<sup>37</sup> The market review found Orange to have Significant Market Power throughout metropolitan France in the market for fixed telecommunications infrastructure access.

The obligations on Orange are to provide access to its ducts to other communications providers for FTTx networks only. The obligations include transparency, non-discrimination, and cost-oriented prices.

##### **Scope of the remedy/product**

The remedy is for both duct and pole access in Orange's network, as well as access to chambers when necessary.<sup>38</sup> The whole of France is considered to be in scope, as Orange is deemed to have SMP throughout. The product is made available for the provision of FTTx services, and does not include the deployment of other technologies such as copper or coaxial cables. The product cannot be used for backhaul networks, only access networks.

Operators have access to a portal for ordering and provisioning. Route plans are not delivered through this portal, but can be ordered through it. The plans are given in AUTOCAD format, and are given on an arrondissement (administrative area) basis. They show the chambers and the number of ducts between the chambers. For aerial deployments, Orange offers access to its planning software CAP FT (for a fee) which provides information on the types of posts and cables existing in the current network, and allows the customer to calculate whether the poles can bear the load of additional cabling.<sup>39</sup>

ARCEP regulation commits Orange to EOI principles. In its 2014 analysis of Market 4, ARCEP details its requirements. Orange must use the same operational processes and techniques as its competitors, it must respect the same engineering rules, and all competitors must be able to reproduce any new

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<sup>35</sup> ARCEP, Décision n° 2014-0733 du 26 juin 2014, p36

<sup>36</sup> Ovum, Regulating Physical Infrastructure Access Overview: France, 2011, p4

<sup>37</sup> Ovum, Regulating Physical Infrastructure Access Overview: France, 2011, p3

<sup>38</sup> <http://wholesalefrance.orange.fr/en/Our-solutions/Network-Infrastructure-Solutions/Optical-Local-Loop-Civil-Engineering-Infrastructure-OLL-CEI/Optical-Local-Loop-Civil-Engineering-Infrastructure-summary>

<sup>39</sup> Orange, offre d'accès aux installations de génie civil et d'appuis aériens d'Orange pour la boucle locale optique, p30

## Cartesian: CEI Service Delivery Process Equivalence Options

offers made by Orange using its infrastructure. Orange must provide details of its internal processes to ARCEP to verify that these conditions are being met.<sup>40</sup>

Orange is also obligated to provide quality of service information to ARCEP should it be requested, in order for ARCEP to perform an audit. These indicators cover the order process, provisioning of services, quality of service in case of failure, and repair time in case of failure.<sup>41</sup>

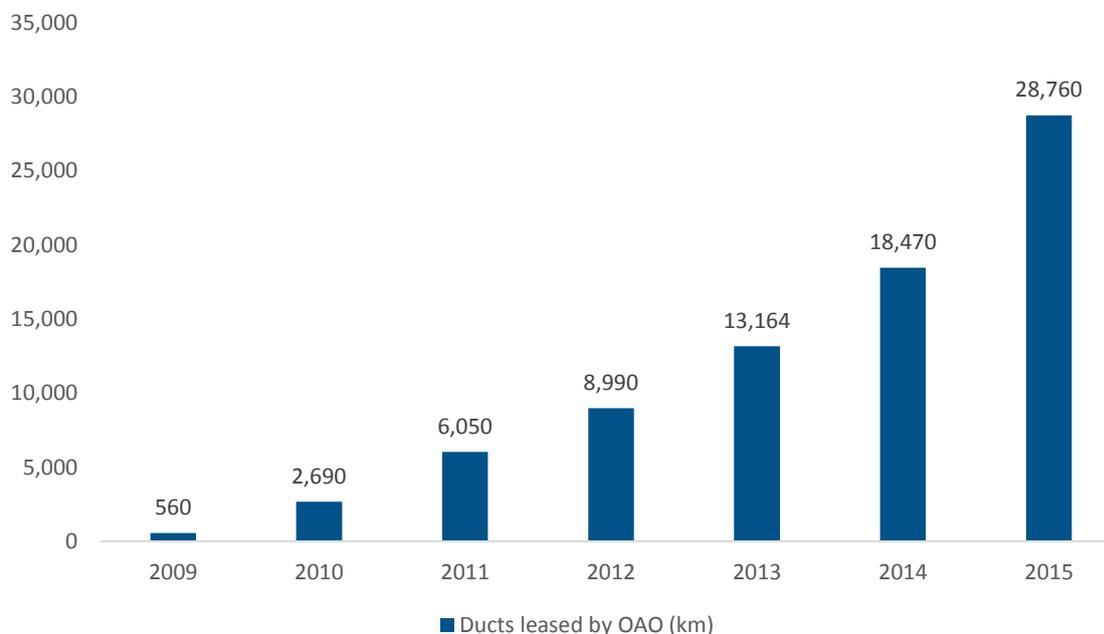
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<sup>40</sup> ARCEP, Décision n° 2014-0733 du 26 juin 2014, 4.3.4 (p117 – 119)

<sup>41</sup> ARCEP, Décision n° 2014-0733 du 26 juin 2014, p127 – 128

Take-up of the solution has been rapid since its launch in 2009. The compound annual growth rate (CAGR) of the use of Orange's civil engineering infrastructure is 48% for the period 2011 – 2015.

**Figure 42. Ducts leased by OAO (km)**



Source: ARCEP<sup>42</sup>

### Processes & Systems

1. Upon receiving a preliminary order on the Integrated Order Interface (IOI) from an operator, Orange provides preliminary documentation which includes route plans, maps and known availability in the case of ducts, and route maps and structural information in the case of poles.<sup>43</sup> Where this information is not available it is the responsibility of Orange to perform the research required to provide it. The information is provided on an arrondissement or commune basis and costs €120 per arrondissement.<sup>44</sup>
2. The operator prepares a statement of study, which is sent to Orange for approval.
3. On approval, the operator is then responsible for conducting a Facilities Utilization Study, which investigates the feasibility of the proposed deployment. The information resulting from this is then shared back with Orange.
  - a. Utilization must be in keeping with the principle of non-saturation, which means that the operator must leave available the equivalent resource to which they are using for their own needs, i.e. if one sub-duct is being used then at least one sub-duct must remain clear following the work.

<sup>42</sup> ARCEP, *Observatoire trimestriel des marchés de GROS de communications électroniques (services fixes haut et très haut débit) en France*, 2009-2015, <http://www.arcep.fr/index.php?id=13128&L=1>

<sup>43</sup> ARCEP, *Décision n° 2014-0733 du 26 juin 2014*, p96

<sup>44</sup> Orange service fees in this section correct as of May 2016



## Cartesian: CEI Service Delivery Process Equivalence Options

- ii. In the cases of major damage, Orange is the prime contractor for the organization and scheduling of repair.

### Conclusions

Orange's PIA offer has had some success, as shown in the chart above. This is thanks to the comprehensiveness of the offering, the operator can choose to deploy in a sub-duct or not, and more space can be made within sub-ducts through unused cable removal or cable regrouping. There are also clear SLAs for response times which not only speeds up the end to end process, but also allows operators to plan around them with a greater degree of success. Orange publishes information detailing average delivery times and the percentage of times the SLA times are met, as below.

**Figure 43. Orange SLAs/KPIs**

Type of Control	Indicator	Contractual Delay	Number of incidences	Alternative Operators	Orange
Preliminary information (plans)	Average delivery delay	10	1277	3.6	6.7
	Rate of meeting the contractual delay			95%	90%
Preliminary information (cable diagrams)	Average delivery delay	15	217	13.3	14.1
	Rate of meeting the contractual delay			100%	82%
Declaration of studies	Average delivery delay	2	1799	0.2	0.2
	Rate of meeting the contractual delay			100%	100%
Accompaniment of an Orange agent	Average delivery delay	2	79	0.6	
	Rate of meeting the contractual delay			97%	
Delivery of keys	Average delivery delay	5	6	22.7	
	Rate of meeting the contractual delay			17%	
Broken duct	Average delay for response to notification	10	81	11.0	8.8
	Rate of meeting the contractual delay			46%	66%
	Delay for repairs	ASAP	110	27.5	47.0
SAV Signage	Average delay until treatment	ASAP			

Source: Orange<sup>46</sup>

Throughout France there is also access to other utility infrastructure for communications providers, most notably the Parisian sewer network. The city leases space in the sewers for a range of services, which avoids the need for expensive street works. This may also contribute to the success of Orange's PIA offering,

<sup>46</sup> <http://www.orange.com/fr/content/download/32493/960621/version/9/file/Reporting%20BGC%20BLO%20Bfevrier%202016.pdf>

## Cartesian: CEI Service Delivery Process Equivalence Options

as there are a variety of different infrastructure access options available which means greater coverage is possible.

### 8.2.2 Portugal

#### **Overview**

MEO (formerly known as PT Comunicações PTC) is the largest fixed-line operator in Portugal. It is subject to regulation obligations including infrastructure access. ANACOM, the national regulatory authority, has determined that MEO has significant market power in Market 4 (wholesale fixed infrastructure access) throughout Portugal.

Wholesale access to its duct and pole infrastructure was imposed in 2004 and in 2010 respectively under the Law of Electronic Communications. The first reference offer for duct access was published in 2006. The current reference offers for duct and pole access (RDAO<sup>47</sup> and RPAO<sup>48</sup> respectively) were published on the 30<sup>th</sup> of June 2015.

#### **Scope of the Remedy / Product**

The remedy is for use of MEO's duct and pole network infrastructure. It is technology neutral, although ANACOM's stated purpose in its regulations is to facilitate NGA network developments. Use of the infrastructure is not limited to the access network, and can be used at any point in network deployment. MEO's duct and pole access offer operates on EOI principles.

The quality and comprehensiveness of the published product documentation by MEO is very good. The product features, processes and procedures are clearly described and explained. It also includes a list of KPIs to monitor quality of service, a list of SLAs and respective penalties, and a pricing table for the different services provided by MEO.

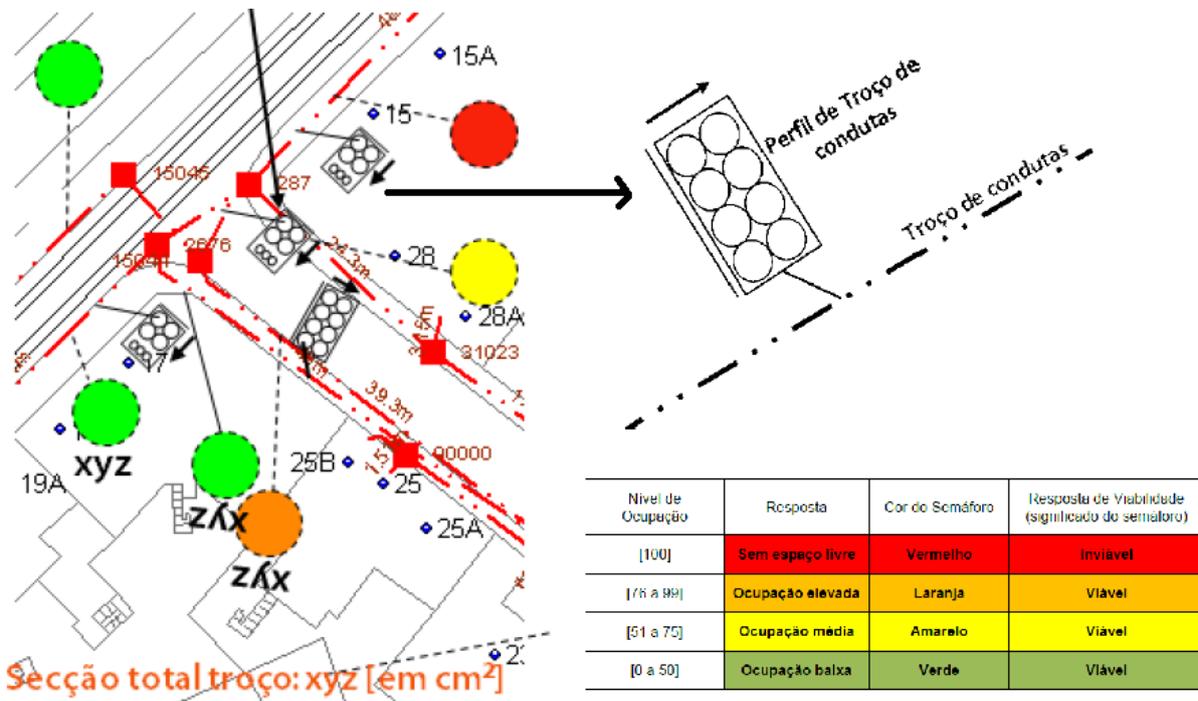
One of the main differentiators versus other countries, is the online web service offered to registered OAOs, containing up to date, detailed information about the duct and chamber infrastructure as well as their capacity usage. The pole information is not in this tool but is available upon request. The figure below illustrates the type of information and the RAG system for duct usage levels available for OAOs.

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<sup>47</sup> MEO – Serviços de Comunicações e Multimédia, S.A. Document - Reference Duct Access Offer (RDAO) v5.2, 2015 06 30, <http://ptwholesale.pt/en/servicos-nacionais/infraestruturas/Pages/orac.aspx>

<sup>48</sup> MEO – Serviços de Comunicações e Multimédia, S.A. Document - Reference Pole Access Offer (RPAO) v3.1, 2015 06 30, <http://ptwholesale.pt/en/servicos-nacionais/infraestruturas/Pages/orap.aspx>

Figure 44. Graphical representation for the Usage Levels and duct and chamber profiles available in the online tool – Extranet



The duct product offering has also fewer restrictions, at many levels, than the other case study countries. For instance:

- Access seekers are granted access to the majority of the MEO’s chambers except to some multi-operator chambers built specifically for the service transport associated with Local access and the ADSL network.
- Routes are allowed between any two eligible chambers, i.e. there are no specific restrictions on topology.
- There is no obligation for the access seeker to install cables strictly in a dedicated sub-duct (except for duct routes in and out of an exchange). The access seeker can install cable directly in the main duct or in a shared sub-duct.
- Access seekers are able to install equipment in the chambers, for example jointing boxes (“junta”), passive optical splitters and additional cable for maintenance purposes. There is a catalogue form for the OAO to list the cables and equipment that this want to install.

Regarding the pole product, the only limitations are the exclusion of third party poles and poles in the process of being removed.

Physical access to MEO’s ducts, poles and related infrastructure (mainly chambers) is granted to the OAO’s personnel and sub-contractors for installation, maintenance and cable removal. These are accredited by MEO.

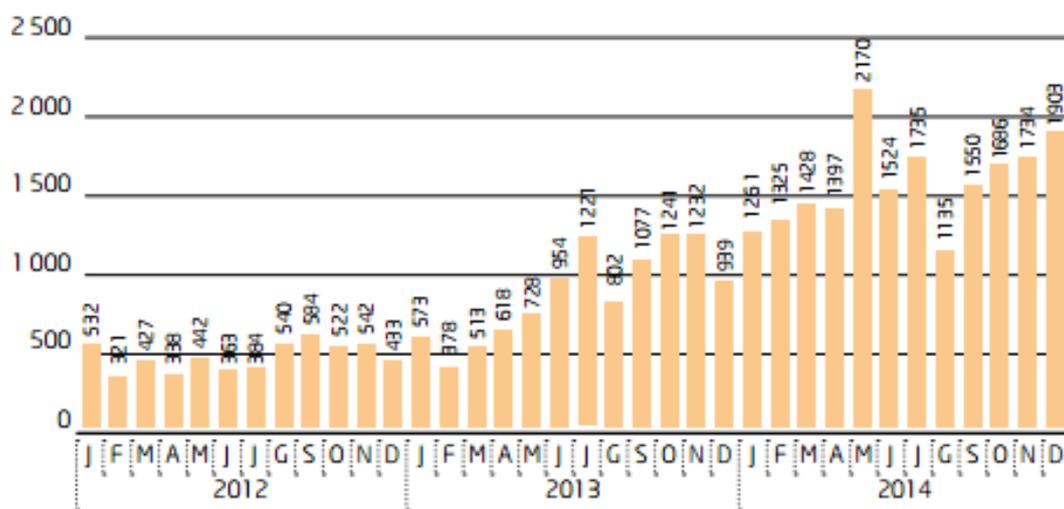
## Cartesian: CEI Service Delivery Process Equivalence Options

MEO is able to decide when supervised access is required to examine the cable installation. However, it's only mandatory during cable installation to an exchange co-lo space or work on entry points to ingress chambers. Also, every OAO is required to have a civil insurance policy to cover any damage to the infrastructure either by their personnel (or sub-contractors) or equipment.

Every operator (including MEO) is obliged to remove any existing cable to free up space in the duct infrastructure.

It is worth mentioning that a dedicated Service Management framework is defined for customer support for both the duct and pole products.

**Figure 45. Number of responses to cable installation request on MEO ducts**



Source: ANACOM based on data provided by MEO

### Processes & Systems

Below, we provide an overview of the fulfilment and assurance processes described in the published documentation for the duct and pole products.

#### Duct Product – Fulfilment Process

The fulfilment process consists of four main stages:

- 1- Desktop survey / analysis conducted by the OAO; access to detailed information about the duct infrastructure and capacity usage levels, allowing the OAO to prepare a detailed access request
  - a. Duct and chamber infrastructure information is available in real-time via a web service called Extranet. This information is kept up-to-date with data collected after each new cable installation or changes to existing cables (at the post-installation stage – see point 4). Access to the system is charged per geographic area (type and volumes).
  - b. This tool allows the visualisation of maps with the duct infrastructure at a national level. It also enables the OAO to electronically request access to the duct designs for

## Cartesian: CEI Service Delivery Process Equivalence Options

duct routes, local access links and chambers locations. If no information is available for a specific duct/area (catalogue) requested, MEO may conduct a field visit.

- c. Information about duct capacity usage is also available via this online tool, providing the duct usage profile between adjacent chambers, with indication of chambers access points. The duct usage is presented in four levels/intervals (no free space, high, medium and low usage). Graphical visualisation of the duct routes and their usage levels is possible – see Figure 44. However, data about the duct link between the access chamber and the exchange is not available; analysis of the access viability is required.

### 2- Feasibility analysis of the access request conducted by MEO

- a. The proposed routes are submitted to MEO for validation, which checks the conditions of the space in the affected duct infrastructure. However, if the usage levels are showing green, the OAO may directly place a request for cable and equipment installation (stage 3). MEO has 8 working days to respond.
- b. The OAO must complete the order form for the proposed route with the detailed information provided via the online tool. Each request takes up to 20 point-to-point routes (i.e. duct links between two chambers).
- c. If the access request is rejected due to lack of free space in the duct, MEO provides a detailed justification (e.g. SMP operator need for the cables in the duct, physical technical limitations). MEO must check alternative routes and record them independently of OAO decision to proceed or not.
- d. Analysis is conducted based on the available info about the ducts and chambers; field visit/inspection if required will be conducted by MEO; it doesn't include identification of potential blockages (RRT) – execute during cable installation.
- e. OAO responsible to request for wayleaves and other authorization during the joint field visit.

### 3- Access to ducts and cable installation conducted by the access seeker

- a. Access and installation work can't start before getting explicit authorisation from MEO; pre-communication of the installation date is mandatory. However, full access to SMP operator ducts and chambers is granted to the access seekers to install the cables and equipment in the requested route. A feasibility study may be required depending on the duct usage level (related to previous stage 2).
- b. OAO must inform SMP operator of conclusion of works.
- c. The interconnection duct/link to SMP operator chambers is the full responsibility of the OAO, including costs.
- d. Work related to the entry points in the ingress chamber must be supervised by SMP operator; scheduled by OAO. Supervised access is optional for the rest of work.
- e. Local access links are OAO responsibility; costs too; demarcation point closer to the end-user premises.

## Cartesian: CEI Service Delivery Process Equivalence Options

- f. Routes are allowed between any two eligible chambers; cables and entry points in chambers must be clearly labelled.
- g. Route unblocking is conducted by MEO but costs are shared among all CPs sharing the route. SMP operator to share work quote with access seeker for approval. OAO informs SMP operator via customer support team and not the account manager. It may request alternative route.

### 4- Post-installation

- a. The OAO must provide a final documentation pack to MEO according to defined templates. This is critical to keep the Extranet web service database up to date (e.g. duct usage records).
- b. This pack includes a cabling catalogue containing detailed technical information of the installed cables and equipment in the ducts as well as report any changes to the initial design.

### Duct Product – Assurance

There is no obligation for sub-duct installation as part of this product offering. Therefore, OAOs are only responsible for their cables and MEO for the duct infrastructure. OAOs have full access to the cables for repair and maintenance but need to inform MEO before the activity. Any change to the configuration of the route or cabling type during this exercise must also be communicated. The communications are made via MEO’s customer support service.

Despite the quality of the documentation, SLAs for duct repair (SMP operator responsibility) couldn’t be found. However, technical support is available 24/7, 365 days a year via the support centre.

MEO lists a comprehensive list of KPIs and associated SLAs in its public documentation. The KPIs are measured in a monthly basis. All the KPI reports are available online and breakdown per OAO and month. Each KPI defines the correspondent SLA, with their times defined. The penalties for MEO not meeting the SLAs are also defined in the documentation available to the OAOs.

**Figure 46. MEO Duct Product KPIs and SLAs**

KPIs / SLAs	Timeline
Time to respond to any data request	1 working day
Time to respond to an access viability analysis request	(10 calendar days, or 8 working days)
Time between request and schedule date for a supervised access request (planned and unplanned maintenance activities)	24 hours and 4 hours consecutive respectively
Supervised access ratio (# of supervised access on the schedule date/total # of conducted supervised accesses)	95%
Time to respond to access and installation request	5 working days

## Cartesian: CEI Service Delivery Process Equivalence Options

KPIs / SLAs	Timeline
Time to respond to an unblocking request inc. a price quote	5 working days

MEO offers a customer support service to all their wholesale customers (including internal customers). This service defines interfaces between the OAO and MEO for three main operational functions namely: request management, technical support and account management.

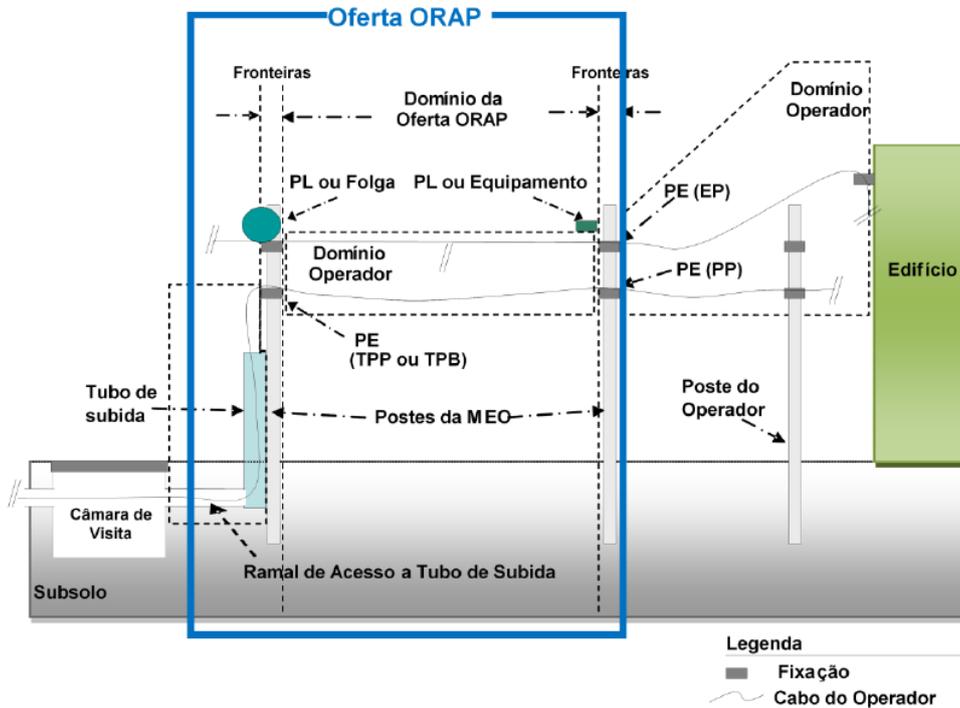
- The wholesale account manager is responsible for billing, contract and commercial relationship.
- Requests for removal, unblocking and change of route designs are with the commercial support as well as access to exchanges.
- Requests for viability and installation are electronic.
- Technical support: maintenance work is communicated to the OAO support centre (unique contact point); available 24/7 365, phone number and email available are provided.

### Pole Product Overview

The pole product specifies 4 different cases for the cable transition from the OAO to MEO network as illustrated in the figure. These are:

- 1) Cable from a building to the pole
- 2) Cable from an OAO pole to the MEO pole
- 3) Cable from a chamber to the MEO pole via duct and riser pipeline or just riser ("*tubo de subida*"), where the latter is installed and is property of MEO
- 4) Similar to the above (3) but the duct and the riser is MEO's property

Figure 47. High-level representation of the Portuguese Pole Reference Offer



Source: Portuguese ORAP document<sup>49</sup>

OAO staff or sub-contractors have access to the poles for cable installation, maintenance and removal. MEO may decide to supervise work if necessary. Accreditations are specified in the document annex.

The technical procedures and engineering rules to be followed by the OAO are available and are part of the published documentation. All the consent request required are OAO's responsibility.

SLAs, KPIs and pricing are clearly defined in the published documentation.

Below, we provide a summary of the fulfilment and assurances processes followed by MEO for providing the pole product.

### Fulfilment

The fulfilment process for the pole product follows the same four major steps as defined for the duct product:

- 1- Desktop survey conducted by the access seeker.

The extranet online service is not available for the pole product; the information is available upon request. Plants with aerial routes and poles are provided. These should be used by OAO to place feasibility analysis and installation orders.

- 2- Validation / analysis of the feasibility of the access request conducted by MEO

<sup>49</sup> MEO – Serviços de Comunicações e Multimédia, S.A. Document - Reference Pole Access Offer (RPAO) v3.1, 2015 06 30, <http://ptwholesale.pt/en/servicos-nacionais/infraestruturas/Pages/orap.aspx>

## Cartesian: CEI Service Delivery Process Equivalence Options

This step is similar to the one described for duct product. The main difference is that is the OAO responsibility to conduct the field inspection to complete the information available in the plants.

The data requirements for the OAO to provide as well as MEO's criteria for validating the feasibility of the request are clearly defined in the published documentation.

A joint feasibility analysis is allowed when the OAO requires both the duct and pole products from MEO and a route goes across both the duct and pole infrastructure of MEO.

### 3- Access and Cable installation

If route preparation is required (as per the feasibility analysis), the OAO needs to accept the cost associated with it but the task is conducted by MEO. Note that the installation work follows defined rules and procedures described in the published documentation.

### 4- Post-installation

Similar to the duct product where the OAO needs to provide a final documentation pack to MEO. This allows MEO to maintain an accurate view of the pole infrastructure.

## Assurance

The assurance support framework is similar to the one described for the duct product. The OAO is responsible for the maintenance and repair of the cables and MEO of the associated poles. Unplanned activities are considered emergency repair activities.

There are fewer SLAs and KPIs defined for pole access versus duct access and they timescales are less stringent. This may be because the pole network is of small size and thus not as critical as the duct product in Portugal.

The table below shows the KPIs/SLAs and their timelines for the pole product<sup>50</sup>. Note that financial penalties are also defined in the published documentation for cases where MEO breaches the SLA.

**Figure 48. MEO Pole Product KPIS and SLAs**

KPIs / SLAs	Timeline
Time to respond to any data request	10 working days
Time to respond to an access viability analysis request	30 working days
Time between request and schedule date for a supervised access request (planned and unplanned maintenance activities)	24 hours and 12 hours consecutive respectively

<sup>50</sup> MEO – Serviços de Comunicações e Multimédia, S.A. Document - Reference Pole Access Offer (RPAO) v3.1, 2015 06 30, <http://ptwholesale.pt/en/servicos-nacionais/infraestruturas/Pages/orap.aspx>

## Cartesian: CEI Service Delivery Process Equivalence Options

KPIs / SLAs	Timeline
Supervised access ratio (# of supervised access on the schedule date/total # of conducted supervised accesses)	90%

### Conclusions

The Portuguese case may be considered best practice for an EOI service delivery approach. The product take-up has been significant during the last few years.

We identified three main success factors for this:

- **First**, access seekers are given significant operational power/freedom to operate in MEO's network under strict and well-defined obligations and procedures. This gives OAOs greater control of the lead times, with minimal intervention from MEO, which reduces costs and improves delivery times.
- **Second**, the quality and detail of the data available upfront to OAOs. MEO has a well-regarded online tool presenting detailed information of the duct infrastructure, including space availability for most of its infrastructure. Therefore, most feasibility studies, planning and design phases, can be carried out without the requirement for field survey inspection, saving significant time and cost to the access seeker. The pole information is not in the online tool but is available upon request.
- **Third**, the documentation is comprehensive, containing detailed procedures of the whole process and clear identified criteria for SMP operator analysis of the requests. The assurance process and support framework, the demarcation of responsibility, the KPIs and SLAs times and penalties are clearly identified in the reference offer documentation. Order forms, the required staff accreditations, extensive manual of procedures and technical specs available for OAOs for installation, maintenance/repair and cabling removal as well as preparation of the post-installation catalogue, are all available publicly to be consulted/used by the access seekers.

### Streamline fulfilment process

- Field work only required if available data is inconclusive. It is conducted by MEO irrespective of whether the access seekers proceed or not in order to update the database for the duct product. Conducted by the OAO for the pole product.

### Assurance guarantees

- The penalties for not meeting the SLAs are well defined in the documentation available to the access seekers.

### 8.2.3 UK

#### Overview

The UK Telecoms industry was deregulated in the 1980s, and British Telecom (BT from 1991) was privatized in 1984.

BT's regulated access and backhaul services are provided by its Openreach division on an equivalent basis to BT's downstream businesses and other communications providers. Openreach was established as a subsidiary of the BT Group in 2006, following an agreement with Ofcom (the national regulatory authority) in lieu of a referral to the competition authority. Openreach owns the physical infrastructure of BT's network which includes around four million poles.<sup>51</sup>

Following Ofcom's 2010 review of the Wholesale Local Access (WLA) market, the physical infrastructure access (PIA) remedy was imposed. In January 2011, Openreach published a reference offer for "duct and pole sharing" specifically for operators looking to build next generation networks.

#### Scope of the remedy/product

The Openreach PIA offering consists of duct and pole sharing. With the duct sharing product, the operator is granted a licence to install a sub-duct within the main access duct, and with the pole sharing product the operator is granted a licence to attach and maintain equipment on Openreach's existing poles. The service is restricted to providing NGA services to end users. It cannot be used for leased lines, core network, or backhaul services (with the exception of Sub Loop Unbundling backhaul services, i.e. between a street cabinet and local exchange).<sup>52</sup> The regulations are technology neutral, and Ofcom's remedy explicitly allows other types of cable to be deployed.<sup>53</sup> The remedy applies to all of BT's UK access network. Operators are responsible for conducting field surveys and cable installation, requiring ISO 9001 and BS25999 accreditation from recognized bodies.

While many of Openreach's access services are provided on an EOI basis, as of the 2013 Fixed Access Market Review PIA is provided on an EOO basis.<sup>54</sup> There is however a move to change this following Ofcom's Strategic Review of Digital Communications. Following consultations with various stakeholders, Ofcom published initial conclusions in February 2016 and proposed to place additional obligations on Openreach. These include the establishment of an online database including the location, condition and capacity of infrastructures deployed, making duct and pole access available for business customers as well as residential consumers, and applying EOI obligations to the processes.<sup>55</sup>

The current PIA offer has not been taken up by communications providers. Operators interested in using Openreach's duct and pole access product argued in responses to Ofcom's consultation that BT's product and processes are not fit for purpose for scale use.<sup>56</sup> Stakeholders including Vodafone and UK Broadband argued that by limiting PIA to the access network BT is preventing other operators from achieving the same economies of scale and scope that it can itself achieve.<sup>57</sup> Vodafone has argued that PIA would be more successful if there was a structural separation of BT at the duct and pole level.<sup>58</sup>

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<sup>51</sup> Analysys Mason, Duct and Pole Survey, 2010, p1

<sup>52</sup> BT Openreach, Agreement for Physical Infrastructure Access Conditions, 2015, p6

<sup>53</sup> Ofcom, WLA Statement, 2010, p103

<sup>54</sup> Ofcom, Annex 11 Fixed access Market Review, 2013, 5.2

<sup>55</sup> Ofcom, Digital Communications Review – Initial Conclusions, 2016, p38

<sup>56</sup> Ofcom, Digital Communications Review – Initial Conclusions, 2016, p37

<sup>57</sup> UKB Group, Response to DCR, 2016, p15

<sup>58</sup> Vodafone, Response to DCR, 2016, p35-37

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Furthermore, it calls for the industrialisation of the PIA delivery processes, through removing usage restrictions, developing online resources, determining what happens when it is not feasible for Openreach to provide PIA and ensuring EOI.

BT has responded that as it has had no requests from communications providers to modify its existing DPA product, which it states “does not suggest any meaningful (but suppressed) demand”.<sup>59</sup> It also argued that to impose additional obligations, such as the creation of an online database of existing assets and their usage, would be disproportionate given the lack of evidence for demand for the PIA product.<sup>60</sup>

The 2016 review is still under consideration and consultation.

### Processes & Systems

- 1) Upon receiving an access request from an operator, Openreach provides (for a charge) data on existing infrastructure. This includes location information and route plans, but does not include usage data. There is currently no binding SLA for response time, though the time is estimated to be 10 working days.
- 2) The operator performs a field survey to assess availability, for which BT charges if access or support are necessary. The operator communicates the information found by the survey to Openreach in order for its records to be updated.
  - a. If the ducts are not viable due to blockages (caused by duct damage for example) it is the responsibility of the operator to pay for repair work, which is carried out by Openreach or its contractors.
  - b. The operator can also identify any redundant cables and if confirmed by Openreach then these can be removed, providing this can be done without disrupting any other operator’s services. Openreach carries out the work and charges a fee.
  - c. If there is still no space in the ducts, the operator can request that Openreach builds additional infrastructure. The operator is liable for the costs of building, and the duct becomes part of Openreach’s access network.
  - d. With agreement from Openreach, the operator may lay cable directly into the duct (without a sub-duct) between end user premises and the nearest connection point, up to a maximum of 100 metres.<sup>61</sup>
- 3) Following the survey, the operator submits a formal application to Openreach with requests for each area the operator wishes to access. There is no current SLA for the response time. If approved, Openreach reserves space in the duct/pole, and charging begins once the operator begins work
- 4) The operator is responsible for installing all sub ducts (up to 25mm diameter) and cables, with the work audited by Openreach during and after completion to ensure it meets its standards

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<sup>59</sup> BT, BT Response to DCR Statement, 2016, p72

<sup>60</sup> BT in Ofcom’s DCR Annexes, 2016, p13

<sup>61</sup> Openreach, PIA Schedule 7, p6

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- a. Openreach provides technical specifications for the permitted cables, other equipment, and installation methods which is the same as its internal specifications for Openreach's NGA deployments
- b. The operator or its contractors require ISO 9001 and BS 25999 accreditation from recognized bodies

**Figure 49. Openreach SLAs and KPIs**

KPIs / SLAs	Timeline
Acknowledge orders for information provision	Next working day
Dispatch route based (point to point) Network Plan requests	10 working days (from validation of initial order)
Dispatch area based (point to multi point) network (up to a maximum of an exchange area) plan requests	20 working days (from validation of initial order)
Acknowledge order for surveys	Next working day
Provide validation of customer plans for surveys	2 working days (from completion of order)
Acknowledge customer plans submitted for approval	Next working day
Approve customer plans	5 working days (route based plans) 20 working days (exchange area plans)

### Conclusions

The Openreach product has not been taken up to any significant extent. There are a number of reasons for this, highlighted extensively by stakeholders in response to Ofcom's 2016 Digital Communications Review, particularly by Vodafone. In particular, they highlight the lack of upfront data on duct availability as a bottleneck for use, as it means the operators have to conduct surveys of their own without a guarantee of success. Also, the lack of clear SLAs for Openreach's responses at various stages slows the process significantly. There are no clear guidelines or options for the removal of redundant cables, or regrouping of cables into other sub ducts in order to free up capacity.

## 9. Glossary of Terms

Abbreviation	Definition
CBYD	Click Before You Dig – online portal used to check Eircom’s current network by access seekers
CEI	Civil Engineering Infrastructure – the name for Eircom’s physical infrastructure access product
CoW	Clerk of Works – agent from Eircom who accompanies OAOs when visiting Eircom installations
EOI	Equivalence of Inputs – an obligation on the SMP operator to use identical processes for internal and external customers
EOO	Equivalence of Outputs – an obligation on the SMP operator to provide the same products to its wholesale customers as to its own units
MIP	Major Infrastructure Projects Eircom considers a major infrastructure programme to be one that contemplates roll-out in at least 10 exchange areas with the intention to pass at least 10,000 premises with a broadband capable service
NGA/NGN	Next Generation Access/Next Generation Network – general terms used for high speed fixed networks, usually fibre based
OAO	Other Authorized Operators – other communications providers
OSS/BSS	Operations Support Systems/Business Support Systems – computer systems used to manage network and end to end telecommunications services
PIA	Physical Infrastructure Access – access to the ducts and poles of an operator for the installation of network cables
RRT	Rod, Rope and Test – method for testing capacity availability in ducts
SLA	Service Level Agreement – formal definition of contract, usually including contracted delivery times and agreed quality of service targets
WPNIA	Wholesale Physical Network Infrastructure Access

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For further information, please contact us at [cartesian@cartesian.com](mailto:cartesian@cartesian.com)