ComReg Passive Access Records Report

Feasibility Study

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1 Introduction

1.1 Background and purpose

Realworld has been commissioned by ComReg to perform a feasibility study of an approach that can provide Access Seekers with real time access to Eircom's Passive Access Records (PAR) in an efficient manner.

The feasibility study is focussed on three main functional requirements:

- To provide real time access to Eircom's Passive Access Records stored in the GE Smallworld Physical Network Inventory system;
- To Enable Access Seekers to select and extract all available information on passive infrastructure stored in Eircom's Physical Network Inventory system;
- To ensure that each PAR record includes a unique reference identifier when extracted.

For the purposes of this report, a hypothetical systems specification has been developed for illustrative purposes to show how these requirements could be realised for what is referred to in this report as the 'PAR Solution'. The report includes an estimate of costs and timescales needed to develop the system.

1.2 Feasibility Study content

The feasibility study includes the following:

- Lists and describes the functional use cases which are in scope for the feasibility study;
- Lists and describes the non-functional requirements such as capacity and responsiveness;
- Provides a high-level overview of the design of the PAR Solution;
- System Environment and Solution Customisation and Configuration;
- Provides an order of magnitude estimate of the costs of the system development; and
- Provides an estimate of the timescale needed to develop the PAR Solution.
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Appendices include:

- More detailed descriptions of the use cases
- Glossary of terms used in the report

1.3   PAR Solution Requirements

This section describes the key functional and non functional requirements that are in scope for the technical feasibilty assessment and estimate of the PAR Solution implemenation costs.

In summary, Access Seekers will be able view, extract and export information on all passive infrastructure objects by selecting specific areas.

Specifically, Access Seekers will be able to access all PAR information through the same GE Smallworld PNI technology that Eircom has access to in real time. Also, Access Seekers will be able to select PAR information for extraction through a customised version of the same GE Smallworld PNI user interface that Eircom has access to in real time.

In addition, the PAR information extracted shall be provided in GeoJSON[1] format and will include unique references (object ids) for each passive infrastructure object.

1.3.1 Functional Use Cases

The PAR Solution will be designed to provide the functionality described in the use cases listed in this section which are related to the requirement to view and extract Information. A more detailed description of the use cases is included in section 4.1.

Use Case Summary

Use Case ID	Category	Use Case Name	Description
AS_UC001	Information	Access Seeker view of PAR data	Access Seeker user searches for location and views asset information
AS_UC002	Information	Access Seeker download of PAR data	Access Seeker selects or sets a boundary and downloads PAR data from that area

1.3.2 Non-functional Requirements

The following requirements have been considered for the purpose of this report:

Capacity

The PAR Solution supporting at a minimum 5 concurrent direct access clients without any degradation of performance.

Transaction Response times

The PAR Solution supporting a responsive interface to the user in all circumstances and for manual data download, a progress indicator being displayed as progress bar.

The table below summarises response times for selected transaction types. It is envisaged that other transaction types not mentioned would perform to a similar standard.

Transaction Type	Description of measurement points	Response time in 95% of occasions
User Sign in	Start: User has logged into the PAR system environment and clicked on the icon to start the client application. Finish: user is prompted with the user name and password screen to log in.	< 5minutes
Display of geographical information in maps	Start : user has selected a location.	< 5 seconds

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[1] GeoJSON is a format for encoding a variety of geographic data structures, as currently specified in RFC 7946.

	Finish : PAR client presents selected location and sets map extent.	
PAR data download for an area < 1 km square	Start: User has selected an area for data download.	<30 seconds
	Finish : Data downloaded.	

2 Highlevel overview of PAR Solution for real time access

The PAR Solution considered in this report provides interactive services through direct read only access to the Eircom production data using two thick client applications. These thick client applications can support the following processes and functions:

- Information
    - o The solution will enable Access Seekers to view and download all available information on Eircom's passive infrastructure assets stored in the Eircom GE Smallworld system.
    - o The viewed and exported PAR information will include a unique reference identifier for each passive infrastructure object. The intention is that such unique reference identifiers can subsequently be used by Access Seekers when submitting orders for access to Eircom Physical Infrastructure.

2.1 Design Principles

The PAR Solution can be based on the same GE Smallworld technology stack that Eircom use to view and record passive infrastructure information.

Also, the PAR Solution should be scalable i.e. shall support concurrent users so that Access Seekers will be able to view and extract PAR information without impacting the performance of the existing Eircom GE Smallworld based systems.

2.2 System Environment and Solution Customisation and Configuration

This report considers that the PAR system would be hosted in a new server environment. Access Seekers should be able to login to this environment using secure VPN access controlled by Eircom.

Once the users have logged in they will be provided with icons which can be used to start the two PAR applications:

- Eircom Client
    - o This will provide the same map navigation and PAR viewing functionality as is used by the Eircom users
- PAR Client
    - o This will extend the Eircom Client with a new data download GUI function. This new functionality will be developed and added to the Eircom code base as a customisation.

PAR Feasibility Study

- o Users will be able to define an area or select an existing area for the download which can be of varying sizes up to an exchange area boundary.
- o Data will be downloaded to a Fileshare located on the new server. The Access Seeker can then copy this data to the existing Eircom Google Drive to ensure that the data can be accessed from the Access Seeker's in-house systems.

All new Access Seeker clients would need to be added to the Eircom authorisation systems before they can successfully open the applications. The GE technology stack enables new users and user groups to be configured through standard product functionality.[2]

The authorisation system controls a number of user rights including:

- Ability to view/update PAR records and attributes
- Ability to use applications and functionality within applications

By default the unique identifiers for the PAR data are not displayed to users of GE Smallworld. The PAR clients will be configured to show the unique PAR references[3]. This will be done using the standard GE Application Configuration Environment (ACE) product functionality. The ACE configures object and attribute user visibility with the application.

Further configuration to application XML files will be carried out to add the new data download functionality to the PAR Client Graphical User Interface ('GUI'). These configuration activities will ensure that once the clients are activated, the users:

- Will be able to view all PAR records
- Will not be able to update the Eircom data
- Will be able to download required data

The diagram below provides a high-level overview of the components

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[2] Note: the GE authorisation can also be integrated with LDAP using standard technology.
[3] Each record in each table has a unique key value field. This is the unique reference for a record.
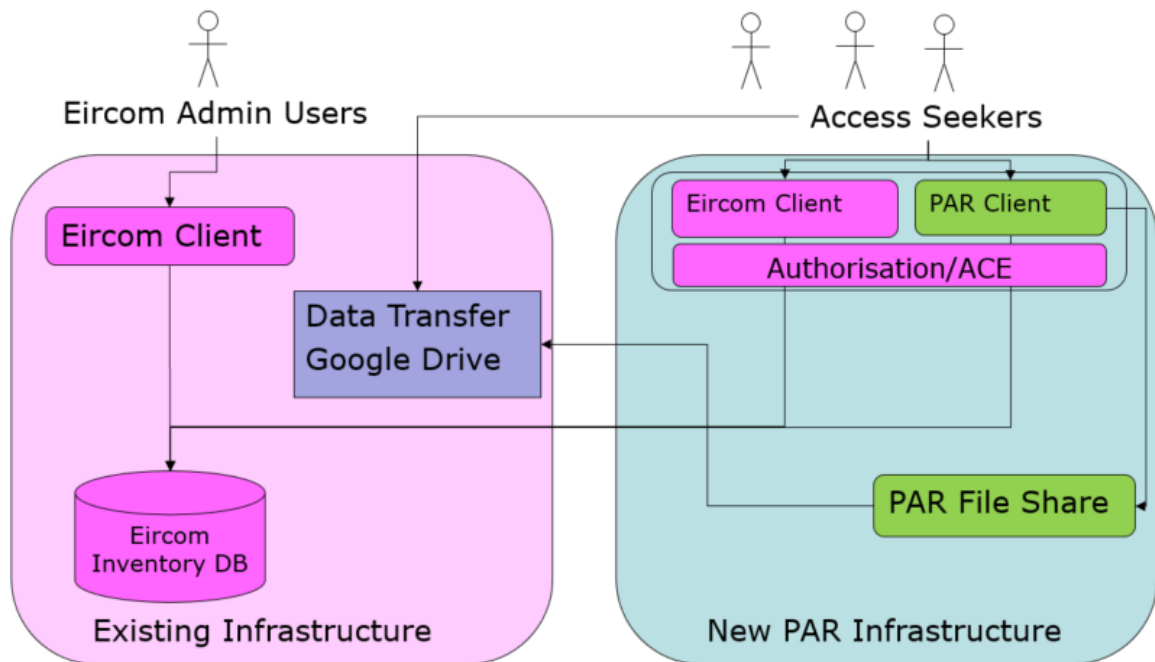
The solution elements are colour coded as described below. For the new elements, the description includes information on the configuration and customisation to be implemented.

Existing systems (Magenta)

- Eircom Inventory DB
  - o This is the Eircom PNI inventory database. It includes details of the inventory, designs which are in progress etc.
- Eircom Client
  - o On the left-hand side of the diagram the Eircom client is shown from an administrative perspective, which is an Eircom PNI thick client application. It includes administration rights which will enable the Eircom system administrator to add new users to the PAR Client.
- Eircom Client and PAR Client
  - o As shown on the right -hand side of the diagram, the clients can also be deployed in the new PAR Infrastructure to provide a direct logon for the Access Seeker or Eircom users. From the PAR client an Access Seeker or Eircom can query, view, and navigate the PAR data directly. Also users can identify the IDs of existing PAR assets and find their coordinates.
  - o The PAR client has the same capabilities as the Eircom client with one main difference i.e., PAR client has additional functionality to facilitate extracting and downloading of the PAR information. The Eircom client and the PAR client have been shown for completeness in the above diagram, from a practical perspective it is envisaged that users would only need to utilise the PAR client for both viewing and extracting information.

- Authorisation
  - o This is a standard product administrator component of the PNI solution.
  - o This can be used to define a new PAR user group which all new PAR users will be added to.
  - o These users will be allowed read-only access to all of the tables in the Eircom Inventory Database
- Application Configuration Environment (ACE)

- o This is a standard product administrator component of the PNI solution.
- o The ACE can be configured to show different Graphical User Interface (**'GUI'**) functions, and also to show a different set of fields for the inventory.
- o A new ACE will be created which will be used by the PAR Client application. This will expose the internal unique identifiers for the PAR data.

PAR extended systems (Green)

- PAR Client
  - o This is the Eircom Client with an extensions to the GUI to support PAR data extraction.
    - ▪ These extensions are configured in application xml files.
  - o The user will be able to create a trail (a temporary closed geometry) or select an existing area object. This will be used to spatially select that data which is to be downloaded.
  - o The PAR data will be enhanced as it is extracted
    - ▪ 'internal' objects will have a geometry created for them based on the structures that they are housed in
      - • This will include conduits, cables, splices and splitters
    - ▪ Objects which 'contain' other objects will be enhanced to include a reference to the inventory housed in them
      - • This will include the cables housed in a conduit, the sub ducts housed in a duct, the splices in a chamber or on a pole, the ducts in a route.
      - • Adding this information will enable the Access Seeker to understand the available capacity for new fibre or sub-duct design
    - ▪ Objects attributes will include information from the related specification record[4]
      - • Conduits will output their dimensions
      - • Cables will output their dimensions and fibre count.
  - o When the data is extracted, it will be saved to the local PAR File Share. The export will then be copied to the Google Drive to provide external access to the data
  - o The exporter can include a progress bar. When the extract is completed, the user will be given back information on the location of the downloaded file.

PAR Infrastructure (Blue)

- New dedicated infrastructure can be deployed to support the PAR test and production systems.
- The Smallworld components can use the same server specifications as are currently used by Eircom which are based on [✂ ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮ ▮▮▮▮▮▮▮▮ ✂]
- The architecture- envisages a Windows file share which is accessible from all PAR servers. This will be used to store the PAR data download extracts

Existing Eircom Infrastructure (Pink/Purple)

- Eircom can use its existing infrastructure and the existing Eircom Client to configure new Access Seeker users into the authorisation system.
- Access Seekers can transfer the downloaded data to the existing Eircom Google Drive which gives external access to Access Seekers,
- The Eircom Inventory database is to be used by the Access Seeker applications to view and download PAR data.

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[4] Each PAR record which describes an asset is linked to a specification record which holds information on e.g. cable types, splice types etc. These specifications hold dimension and sizing information.

2.3 User Roles

Access Seekers will be accessing Eircom PAR information stored in inventory database directly i.e. viewing or extracting the PAR information.

All Access Seekers will have to be registered before they can gain access to the systems. Access Seeker who are to log in directly can be allocated VPN access according to Eircom's security policies.

The following table sets out user and access types:

Organisation	User Type	Access Type
Eircom	System Admin, user	Read Write System Configuration User Setup Metric analysis
AS Client	Read, Data Request	Read from inventory database

3 Estimate of Development Cost and Timescales

3.1 Introduction

Realworld have undertaken a design review of the PAR Solution requirements and have estimated the effort and cost required to develop the Solution. These estimates are based on:

- The functional and non-functional requirements set out in this document
- The current Eircom inventory products, and systems
- Our experience of similar development projects

3.2 Assumptions

- Eircom will be responsible for enabling the likes of VPN and firewall configuration for the PAR systems
- Eircom will be responsible for providing the required network infrastructure to ensure that the PAR systems have the required access to the Eircom PNI databases

3.3 Estimates of cost and timescales

PAR Solution Project Costs

All estimates are based on a blend of the following non-Eircom resources

- 1 Project Manager
- 1 Technical Lead
- 1 Tester
- 0.5 Trainer
- 2 Software Developers

Eircom Project Costs

Estimates are based on a blend of the following Eircom resources

- 1 Project Manager
- 1 Test Lead
- 1 Infrastructure/Deployment Lead

3.3.1 Solution Delivery Costs

PAR Project Costs

Estimates of costs and timescales for non Eircom resources:[5]

		Total	Total
Technical Stage 1 - Planning		9.0	€ 7,740
Technical Stage 2 - Business Requirements Analysis		10.0	€ 8,600
Technical Stage 3 - System Configuration		35.5	€ 28,580
Technical Stage 4 - Migration and Data Population		0.0	€ 0
Technical Stage 5 - Background Mapping		0.0	€ 0
Technical Stage 6 - New Development		19.0	€ 15,080
Technical Stage 7 - Training		10.5	€ 7,950
Technical Stage 8 - System Testing		15.0	€ 11,820
Technical Stage 9 - Deployment		14.5	€ 12,050
Technical Stage 10 - Go Live and Adoption		4.5	€ 3,810
Overview of Project		5.0	€ 4,300
Management Stages 3,4, & 5 - Proposal		0.0	€ 0
Totals		123.0	€ 99,930

A total implementation cost of Euro 99,930.

It should be noted that the largest effort on the project is linked to configuration activities. These will include:

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[5] Note a more detailed breakdown of the effort is included in the Work Breakdown Structure – PAR – Realworld – WBS 1.5.xlsx

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- Application configuration on the PAR Environment
  - o Alias and icon definition
- Authorisation configuration
- ACE Configuration
- Application XML configuration

Eircom Project Costs

It is anticipated that Eircom will spend around 60 days on the management, integration, infrastructure setup and testing as part of the overall project.

PAR Project Timescales

It is anticipated that the project can be delivered in 10 weeks as shown in the high level scheduled below.

Week	1	2	3	4	5	6	7	8	9	10
Kick Off	■									
Plan/Design		■								
Configuration			■	■	■					
Customisation			■	■	■	■				
FAT Test/Doc							■			
Train/UAT Test								■	■	
Deploy/Go Live			■			■				■

3.3.2 Software License and Support Costs

Smallworld Licensing

The costs for Smallworld Licensing have been provided to ComReg directly from GE.

3.3.3 Server/Infrastructure Costs

No estimates are provided for Server Infrastructure costs as the type of servers that Eircom may wish to use are not known.

4 Appendices

4.1 Use Cases – Detailed Description

4.1.1 AS_UC001: Information: AS Manual View of PAR Data

Use Case	Information : AS Manual View of PAR data

XREF	AS_UC001
Trigger	Access Seeker User Logs in to the Eircom Client Server and Starts a Client Session
Precondition	The Eircom Solution is available for access
	User Administration complete
Basic Path	1. AS user is presented with a map of Ireland
	2. AS user searches the map by selecting an area and zooming in/out, or enters a postal address
	3. User can identify the start and end coordinates of PAR assets for linear features, e.g. underground route
	4. User can identify the location of point type PAR assets – e.g. pole and chamber
	5. User can turn layers on and off showing for example
	a. Underground routes
	i. Attribute data including the internal id of the object, its length, construction status etc.
	ii. Related 'containment' information, including ducts contained in the underground route, cables contained
	b. Underground Utility Boxes (Chambers)
	i. Attribute information such as the type, specification, construction status and name
	ii. Related 'containment' information including any splices (joints) and splitters contained in the location and ducts/cables entering the chamber
	c. Poles
	i. Attribute information such the condition, barcode, construction status
	ii. Related 'containment' information including any splices (joints) and splitters contained in the location and ducts/cables entering the chamber
	d. Aerial Routes
	i. Attribute data including the length of the route
	ii. Cables included in the route
	e. Fibre Cables
	i. Attribute data including the length, spec and name of the cable
	ii. Related container information, including all of the ducts, chambers and poles that the cable is route along
	iii. Connectivity information, including how the fibres in the cable are spliced at either end
Alternative paths	
Postcondition	-
Exception Paths	
Other	

4.1.2 AS_UC002: Information: AS Manual Download of PAR Data

Use Case	**Information :** AS Manual Download of PAR Data
XREF	AS_UC002
Trigger	Access Seeker User Logs in to the PAR Client Server and Starts a PAR Client Session
Precondition	The PAR Solution is available for access User Administration complete

Basic Path	1. AS user is presented with a map of Ireland
	2. AS user searches the map by selecting an area and zooming in/out, or enters a postal address
	3. User either creates a closed 'trail' defining the request area, or selects an areas object from the map
	4. User activates the 'PAR Export' option from the GUI
	5. AS user selects the layer of data which they wish to request:
	    a. Structures – including chambers, poles, access points buildings
	    b. Routes – including underground and aerial routes
	    c. Ducts – including duct and sub duct
	    d. Cables – including fibre cables
	    e. Equipment – including joints
	6. User clicks 'Export data'
	    a. If the user has not set a trail or selected an area they will be informed that they must do this first
	    b. A progress bar will show the user the progress of the export
	7. When the export is complete a popup will inform the user
	    a. where on the external Google Drive, the file has been exported to and the name of the file
	    b. The PAR Reference for the 'Export Data' request

Alternative paths	
Postcondition	-
Exception Paths	1. User may interrupt the export, in which case the request will not be logged 2. The user may not select an areas or create a closed trail in which case the user will be informed
Other	

4.2 Glossary

Client Server

Client-server model is a distributed application structure that partitions tasks or workloads between the providers of a resource or service, called servers, and service requesters, called clients.

Geographic Information System

A geographic information system is a type of database containing geographic data, combined with software tools for managing, analysing, and visualizing those data.

Inventory

Inventory is the term to describe all of the network and civils infrastructure. It includes poles, chambers (underground utility boxes), trenches (underground routes), Aerial sections, fibre cables, joint and ducts (conduits).

Object

The Smallworld Inventory Solution is based on an object oriented. Relational and spatial database solution. Database records are stored in tables, when these are used in the client systems, they are seen as objects which hold both data and behaviour. All of the application functions use the objects which 'wrap' the database records.

Object id

Each database record in the Smallworld Inventory solution is stored in a database table with a unique key. This can be made up of one or many of the data attributes. Most of the PAR records has a single integer key which is auto-generated. This key provides the unique object id of the record when it is used in the application.

PAR Solution

The Passive Access Records (PAR) System is the proposed name for the solution the implements the use case functional and non-functional requirements.

Shapefile

The shapefile format is a digital vector storage format for storing geographic location and associated attribute information. This format lacks the capacity to store topological information.

Thick Client

In computer networking, a thick client is an application that typically provides rich functionality independent of the central server. This is in contrast to a thin client (e.g. a browser app), where the main processing is done in a central server.

VPN – Virtual Private Network

A virtual private network extends a private network across a public network and enables users to send and receive data across shared or public networks as if their computing devices were directly connected to the private network. This is implemented using secure encrypted technology.