

# Communication Requirements for Connection to Substations



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WI-NET-ENG-009	Communication Requirements for Connection to Substations		Applies to	
			Distribution Ü	Transmission Ü
Revision: 3.00	Classification: Public	Issue Date: October 2019	Review Date: October 2022	

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# 1 Introduction

- 1.1 Scottish and Southern Electricity Networks (SSEN) have a requirement to install control & monitoring equipment at the Customers point of connection to facilitate the operation of the electrical networks. Operation is carried out remotely by SSEN’s Control Rooms in the north of Scotland and central southern England.
- 1.2 The purpose and scope of this document is to provide guidance on the communications and telemetry options available to SSEN to facilitate new connections. The document sets out the minimum communications expectations.
- 1.3 This document will provide sufficient information to enable the Commercial Team to provide estimates with a degree of accuracy and consistency while providing certain assumptions and caveats to be incorporated within any commercial offering.
- 1.4 Currently out of scope is any additional requirements such as protection, intertripping, site security, metering or any other services required by SSEN as a result of a new Customer connection. As an example, where SSEN are being commissioned to construct a new substation, any such services required to facilitate the operation of the site will require further consideration within any commercial offering.

For plant interface requirements, refer to TG-NET-PAC-002

# 2 References

- 2.1 The documents detailed in Table 2.1 - Scottish and Southern Electricity Networks Documents and Table 2.2 – External Documents below, should be used in conjunction with this document.

Table 2.1 - Scottish and Southern Electricity Networks Documents

Reference	Title
TG-NET-PAC-002	SSEN Operational Metering Data and Signalling Requirements
TG-NET-ENG-009	Technical Guidance for the deployment of Telecommunications in SSEN Substation (For Internal Use Only)

Table 2.2 – External Documents

Reference	Title
ER G99	Requirements for the connection of generation equipment in parallel with public distribution networks on or after 27 April 2019

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### 3 Option Categories

#### 3.1 Distributed Generation Connections

Table 3.1

Connected Capacity	Generator Type (G99)	-Type of Real Time Telecommunications Link
<0.2MW	Type A	Not required
0.2MW - 1MW	Type A	Dial-Up
1MW - 10MW	Type B	Permanent
10MW +	Types C and D	OTN

#### 3.2 Demand Substations

Table 4.2

Highest Substation Voltage	-Type of Real Time Telecommunications Link
Less than 22kV	Dial-Up
22kV or above	OTN

### 4 Technical Options

There are a number of different communications options that can be deployed, all of which fall into two categories:-

#### 4.1 Dial-up

An event change on site will initiate a call to the host system. The host system interrogates the RTU at pre-determined period, usually measured in hours. Requests for data and controls may be issued from the host system.

Table 4.1-Dial-up Technologies

Solution	Advantages	Disadvantages	Comments
Public Switched Telephone Network (PSTN)	Obligation on BT to connect service. Power autonomy is +72hrs	Considerable excess construction charges may apply in rural areas. Call set-up time up to 7s. End of life notice for 2025.	PSTN no longer deployed
Wholesale Broadband Managed Connect (WBMC)	Readily available product over BT lines	Requires BT / Others infrastructure to be provided into a building. Service level for both provision and maintenance not reliable.	WBMC is a preferred solution in urban areas.

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Public 4G	Coverage is generally good. Quick to deploy.	There is no guaranteed service level. Power failure can be <20mins. Remains an expensive dial-up option due to call charges	Usually lowest cost option where coverage is available.
PAKNET	Coverage is good in provisioned areas. There is a SLA with this service	Coverage is limited in rural areas. Legacy service now being actively decommissioned.	No longer utilised.
BGAN – Broadband Global Area Network - Satellite	Easy to deploy, should provide connectivity in areas not covered by GPRS..	Requires visibility to the South. Not suitable to deploy in valleys that run east to west. Highest operating cost system. New technology, deployed in field but lifetime experience limited.	Due to high operating costs and limited field experience this option may only be deployed if requested by the customer.

#### 4.2 Permanent

An event change on site will only be issued by the RTU following a request from the host. There is always an open connection between the host system and the RTU. The host system interrogates the RTU at pre-determined period, usually measured in seconds. Requests for data and controls are issued from the host system.

Table 4.2-Permanent Open Access Technologies

Solution	Advantage	Disadvantage	Comments
Scanning Radio	Robust service level and within SSEN control. Suitable for pole mounted deployment.	Requires considerable planning, Ofcom licence. Dependent on line of site to the nearest Radio Base Station with capacity. Cost of core infrastructure needs incorporated	Preferred option in rural areas, where mountainous/hilltop solutions are deployable. Site sharing as well as other costs must be incorporated.
TSAT- Satellite	Easy to deploy, more suitable for lower terrain areas than Scanning radio.	Requires visibility to the South East Sky. Not suitable to deploy in valleys that run east to west; not suitable for pole mounted installations. Highest capital cost system.	Preferred option in rural areas, where line of sight is not suitable for point to point scanning radio.
Wholesale Broadband Managed Connect (WBMC)	Readily available product over BT lines	Requires BT infrastructure to be provided into a building. Service level for both provision and maintenance not reliable.	WBMC is a preferred solution in urban areas with a 4G backup. 4G backup is installed to protect from high volume failures as a result of an ISP failure on WBMC.

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OTN - Operational Technology Network	Robust service level and within SSEN control. Facilitates all SSEN communication needs.	Space requirement for equipment and batteries. Requires fibre or microwave bearer circuit.	May be lowest cost solution if fibre optic cable is being laid as part of the connection design.
Interim 4G followed by permanent solution	Coverage is generally good. Quick to deploy.	There is no guaranteed service level. Power failure can be <20mins. An expensive option due to data charges	Only to be deployed as part of a two step solution where customer will only pay for final communications solution.
BGAN – Broadband Global Area Network - Satellite	Easy to deploy, more suitable for lower terrain areas than Scanning radio. Pole mountable.	Requires visibility to the South. Not suitable to deploy in valleys that run east to west. Highest operating cost system. New technology, deployed in field trials but lifetime experience limited.	Due to high operating costs and limited field experience this option may only be deployed if requested by the customer.

### 4.3 OTN

The Operational Technology Network (OTN) is the communications network that provides the connectivity and service capability for the successful control and operation of the SSEN network. The OTN is a network of substations and operational sites that are interconnected using a common set of equipment and connectivity methods such that a ubiquitous set of services are available at each site.

Table 4.3-OTN Infrastructure Requirements

Solution	Bandwidth Required (Mbps)	Advantage	Disadvantage	Comments
Fibre Cable	622Mbps	Robust service level and within SSEN control. Fibre must be laid with any power cable to new sites	Requires planning and civil costs.	Preferred option in all areas and compulsory at 66kV and 132kV.
Microwave	34Mbps	Robust service level and within SSEN control.	Requires line of sight to nearest point of connection. Site sharing and planning are time consuming. Not always suitable due to latency requirements	Preferred access option where fibre deployment is not cost effective.
The following two options are not suitable for full roll-out of the OTN but may be used for single customer sites with no foreseeable additional communications requirement (such as protection or site security).				

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Wholesale Broadband Managed Connect (WBMC)	N/A	Readily available product over BT lines	Requires BT infrastructure to be provided into a building. Service level for both provision and maintenance not reliable.	4G backup to be installed to protect from high volume failures as a result of an ISP failure on WBMC.
TSAT- Satellite	N/A	Easy to deploy.	Requires visibility to the South East Sky. Not suitable to deploy in valleys that run east to west; Low bandwidth and high latency compared with other options. Highest operating cost of OTN options.	Last resort option where neither fibre nor microwave links are economically viable. Not suitable where Active Network Management or flexible services/connections are required.

All new primary and grid substations, and all distributed generation greater than 10MW shall be connected to the OTN.

## 5 Process for Arranging Telecommunications

### 5.1 Contestable / Non-Contestable Division

The provision of a real time telecommunications link shall generally be non-contestable works provided by SSEN. This ensures that the full communications path can be established through security systems. The exception is where the preferred option is to install a fibre optic to form part of the communications circuit. The provision of fibre bearer medium will be included in the contestable works. In such cases, SSEN will retain the responsibility for commissioning the full communications path.

### 5.2 Arranging Communications within SSEN (for internal use only)

RTSD is responsible for the provision of real time telecommunications links. The process for engaging RTSD for all projects is via the PRS. The PRS database is stored at <http://ghpwae06.rt.ssegroun.net/>.

A new user or requester must register a new account with all contact details supplied.

New requests will be checked weekly and assigned to a member of the Team to facilitate subject to the requirements within defined lead times.

Information to be submitted within PRS prior to acceptance of project whether for desktop quote or request to produce to detailed design/install

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5.3 Information to be submitted prior to acceptance of project whether for desktop quote or request to produce to detailed design/install

- a) Cost Centre and Project Number
- b) Key Customer contact details (commercial quoter or customer design authority)
- c) Site Name and Location (Grid Reference)
- d) Anticipated connection date
- e) DNO
- f) Type of Breaker
- g) Connection Voltage
- h) Type of Housing/Building on site
- i) Export Capacity
- j) Site drawings depicting location of buildings, site access and accommodation
- k) Anticipated Customer SLA's
- l) Export blocking required yes/no

## 6 Indicative lead times for Real Time Telecommunications Links

Table 6 - Indicative Lead Times

Category	Indicative Lead Time
4G	12 weeks
4G to Pole Mounted Circuit Breaker	12 weeks
Dial-up if satellite option required	12 weeks
Permanent	20 weeks
Permanent to Pole Mounted Circuit Breaker	20 weeks
OTN	26 weeks

## 7 Revision History

No	Overview of Amendment and Text affected	Previous Document	Revision	Authorisation
01	New document created	n/a	1.00	Andrew Robertson
02	Amendments to establish as Public document	Rev 1.00	2.00	Andrew Robertson
03	Alterations to thresholds to align with G99. Inclusion of WBMC. Removal of PSTN, ADSL, GPRS and Paknet as possible options. Inclusion of demand sites.	Rev 2.00	3.00	Andrew Robertson