

The Voice of the Networks



Energy Networks Association

Open Networks Project

**WS1B P3 - Real Time Data Exchange and Forecasting
OTS Functional Design and Data Exchange Requirements**

10th July 2020

WS1B P3:
Restriction: Open Networks

Document Control

Version Control

Version	Issue Date	Author	Comments
V1	19/05/2020	John West	Initial skeleton report for discussion with Product Team
V2	01/06/2020	John West	Updated report for WS1B meeting with initial product team comments.
V3	5/06/2020	John West	Updated report following Product Team webex on 4 th June.
V4	17/06/2020	John West	Updated report following Product Team webex on 10 th June.
V5	25/06/2020	John West	Updated report following Product Team webex on 19 th June and subsequent discussions with NGESO & DNO reps.
V6	03/07/2020	John West	Final draft report for WS1B meeting following Product Team webex on 2 nd July.
Final	10/07/2020	John West	Final report following review at WS1B meeting on 7 th July. For review at ON Steering Group
Final	27/07/2020	John West	Final report for publication following ON Steering Group review and inclusion of Appendix A

Table of Contents

1	Introduction.....	2
	i. Open Networks Project.....	2
	ii. Scope of this report.....	2
	iii. Structure of this report.....	2
2	OTS Basics and Recap of 2019 Work.....	3
	i. Introduction to OTS Arrangements.....	3
	ii. Capped Generation Approach.....	3
	iii. Scheme Architecture and OTS Stages.....	4
	iv. OTS Performance and Data Exchange Requirements.....	5
	v. Implementation and System Integration.....	5
3	Description of Ongoing OTS Projects.....	6
	i. OTS Scheme in UKPN Area.....	6
	ii. OTS Scheme in SSEN Area.....	7
	iii. OTS Scheme in WPD Area.....	8
4	OTS Performance & Data Exchange Requirements.....	9
	i. OTS Performance & Component Redundancy.....	9
	ii. OTS Data Exchange Requirements.....	10
5	Standard Requirements / Differences Across Schemes.....	11
	i. Similarities & Differences across OTS Arrangements.....	11
	ii. Emerging Issues & Good Practice.....	11
6	Data Transparency.....	11
7	Appendix A.....	12

1 Introduction

i. Open Networks Project

The Open Networks (ON) Project is a major industry initiative that will transform the way our energy networks operate, underpinning the delivery of the smart grid. The project looks to change how the networks operate to facilitate the transition to a smart, flexible energy system. A key objective is to bring consistency in approaches across networks through existing and new processes to support the transition to Distribution System Operations, interactions with each other and interactions with customers. Open Networks is being delivered through a number of Workstreams and Products.

Workstream 1B of the ON project focuses on Planning and Forecasting activities. These include Product 3 on Real Time Data Exchange which is intended to cover the data exchange requirements to manage whole system activities including Operational Tripping, Connect and Manage arrangements and Service Conflict Management.

ii. Scope of this report

This report covers initial work on Operational Tripping Scheme (OTS) arrangements being implemented on DNO networks to enable the tripping of Distributed Energy Resources (DER) for faults on the GB transmission network.

The 2020 project Initiation Document for the ON project includes the following scope for Product 3 work on OTS arrangements. A report on activity 1 to document OTS requirements including functional and data exchange requirements is due to be completed by June 2020. The remaining work on OTS arrangements covered by activities 2 and 3 would be added later in 2020.

Ref	Product Element	Activities	Deliverables
1	<p>Identify data exchange specifications & implementation plan for Whole System activities based on Regional Development Programme (RDP) outcomes.</p> <p>(This will draw on the implementation of OTS, C&M and Service Conflict Management solutions through RDPs.</p> <p>There is a dependency on ESO-DNO commercial agreements.)</p>	<p>[A] Operational Tripping Scheme (OTS) design & specification to secure N-3 contingencies on the transmission network.</p> <ol style="list-style-type: none"> 1. Document OTS requirements including functional & data exchange. 2. Review the OTS algorithm and review trial results. 3. Review end-to-end ESO-DSO system integration and go-live. <p>This work will draw on ongoing OTS work including implementations in the UKPN, WPD and SSEN areas. An initial report will focus on activity 1. This will be extended to cover activities 2 and 3 when OTS implementations are further progressed.</p>	<p>Activity 1 Report Jun 2020</p> <p>Activities 2 & 3 Report Nov 2020</p>

iii. Structure of this report

This report is focussed on the requirements for data exchange as identified for ongoing OTS projects. Section 2 of the report recaps the position laid out in the 2019 report for Workstream 1B Product 3 including the agreed approach to operational tripping arrangements and high level descriptions of the scheme architectures and data exchange requirements.

Section 3 provides more detailed descriptions of the OTS arrangements being installed in the UKPN, SSEN and WPD distribution areas. Section 4 details the performance requirements for OTS arrangements and the data exchange associated with these arrangements.

Section 5 brings out conclusions in respect of the different implementations including areas where a similar or standard approach is being agreed and areas where differences are evident. Emerging good practice is highlighted together with problems that have been identified to date.

In line with network company undertakings to consider where data can be made more transparent, Section 6 considers whether the data being handled for OTS arrangements would have wider value to industry stakeholders and the extent to which the data can be shared more widely.

The cap for each GSP applies to the generation in the GSP that has agreed to be curtailed through connection agreements and that is part of DNO control arrangements. The cap does not apply to the total distributed generation connected to the GSP as this would be less effective owing to the volume of generation and demand that cannot be controlled.

Under the Capped Generation Approach, NGENSO would send the required MW values to the DNO as an instruction from an iEMS screen via an ICCP link. This enables the DNO to act on the instruction automatically if it chooses to do. The DNO control scheme is designed to achieve an overall response time and the DNO must also ensure that OTS actions are not countermanded by other real-time systems acting on the generation such as ANM schemes.

The design and development of the N-3 OTS algorithm with a Capped Generation Approach began in June 2019 between UKPN, SSEN, WPD and NGENSO.

iii. Scheme Architecture and OTS Stages

To manage transmission constraints post fault using DER, a system is needed to curtail DER quickly by automatic action in the event of an N-3 condition reducing the transmission capacity available in real time. This is based on using NGET’s standard OTS system to detect faults on the transmission system and send a tripping/de-load signal on a per GSP basis to a DNO control system, which will curtail generation in the required GSPs. NGENSO will instruct the DNO on the requirements for generation curtailment via an ICCP link and DNOs are fully automating their response to such instructions.

Figure 2 shows the overall communications architecture of the N-3 intertripping system and the 4 key stages to the process – prior to arming, arming, tripping/triggering and disarm/restore.

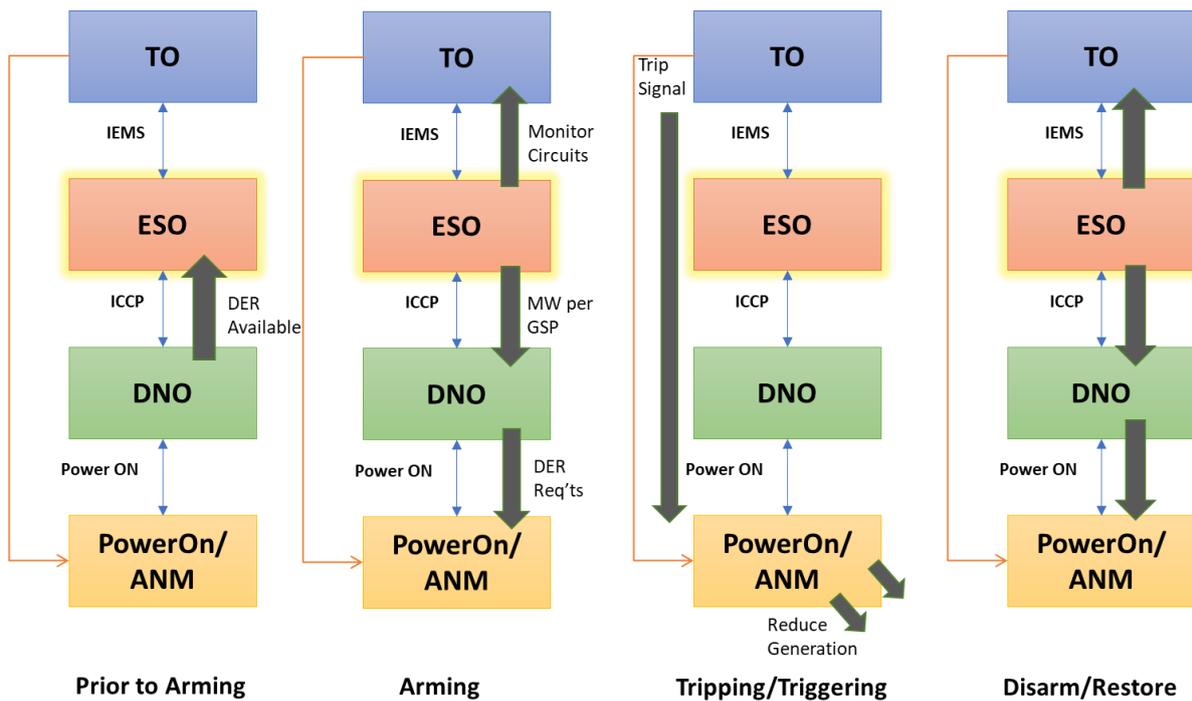


Figure 2 – High Level OTS Architecture and Data Flows.

“**Prior to arming**” (i.e. steady state), the DNO will provide visibility of all DER generation available to be curtailed under each GSP to NGENSO. NGENSO will continue to monitor the outputs and system conditions.

At the “**arming**” stage, NGENSO identifies a possible N-3 event and requests the DNO for a MW volume to be available to be reduced per GSP. At this stage, this is a request to be ready and the DNO control system will not curtail generation. NGENSO will also instruct the TO OTS to start monitoring circuits for fault outages.

The third stage is the “**tripping/triggering**” phase where, if the fault occurs on the transmission system, a trip signal will be sent from the TO OTS to the DNO control system. Upon receipt of the TO trip signal, the DNO control system will have an agreed duration to reduce the generation to the cap level set at the arming stage.

The fourth stage is “**disarm/restore**” when the system conditions are back to normal. NGESO will coordinate the resumption of normal system operation.

It is worth noting that the third stage (generation intertripping) does not happen very often. Historical data shows that a particular double circuit fault in the transmission system is typically a 1 in 100-year event. The double circuit fault happening during another single circuit outage (the N-3 scenario) makes it an even smaller probability event.

iv. OTS Performance and Data Exchange Requirements

The OTS will only include DER resources that can be controlled by the DNO and that have had intertripping requirements placed on them through connection agreements. It is not proposed to include generators that were connected prior to the inclusion of these specific contract clauses.

DER resources that are part of an OTS scheme might be quickly tripped or ramped down to meet the OTS requirement. Much of the N-3 OTS infrastructure is being built such that a single software or hardware failure will not result in the whole system being unavailable though there are some exceptions to this due to cost benefit considerations. The OTS design and level of redundancy is intended to make the operational intertripping of DER equivalent to transmission protection arrangements and will allow NGESO to utilise it in managing the whole system.

To make the OTS arrangements work, a number of data points are expected to be exchanged between ESO, TO and DNOs. At a high level it is summarised as follows:

- DNOs will share real time controllable DER at each GSP with the ESO. This will be via ICCP link.
- The TO will share outage and circuit status information. This is a business as usual process.
- The ESO will send arming and restore instructions to the DNO and TO.
- The TO will send trip signals to the DNO via a dedicated link.

OTS performance and data exchange are considered further in section 4 of this report.

v. Implementation and System Integration

Currently, OTS arrangements are being implemented on the south coast where transmission constraints for certain N-3 conditions are either caused or exaggerated by increasing DER volumes. UKPN, WPD and SSEN are working with NGESO and NGET to implement N-3 intertripping arrangements. UKPN already have an ICCP link with NGESO and WPD and SSEN are implementing similar links. At the same time, NGET is working with the DNOs to establish dedicated trip signal links from its OTS systems (Sellindge OTS in the South East and Melksham OTS in the South West). The first OTS will be operational from late 2020 in the South East followed by the South West in early 2021.

3 Description of Ongoing OTS Projects

The areas to be covered by the 3 OTS projects are shown in Figure 3. With these OTS arrangements in place, the pre-fault transmission capacity into the South East, the South West and along the South Coast will be increased.

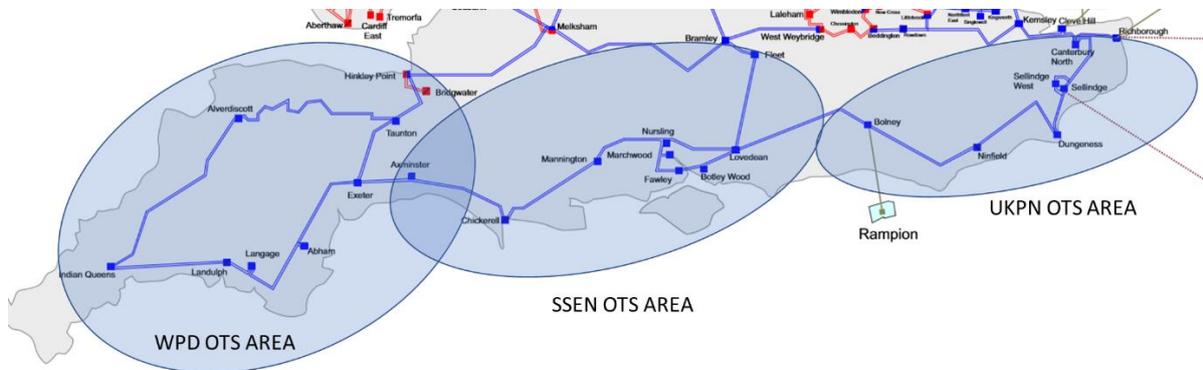


Figure 2 – Areas Covered by OTS Arrangements

i. OTS Scheme in UKPN Area

This OTS is being delivered through the NGENSO-UKPN Regional Development Programme. It utilises the existing transmission OTS at Sellindge and is intended to help secure transmission outages on the double circuit 400kV route from Kemsley through to Bolney. The OTS will cover five GSPs on the South Coast including Bolney, Ninfield, Sellindge, Canterbury and Richborough (once fully commissioned). The UKPN interface substation is at Sellindge.

It is anticipated that upwards of 200MW of DER resources will be available via the OTS arrangements. The generators included in the scheme have agreed to this through their connection agreements and a full list of the generators for each GSP is being maintained through NGENSO-UKPN connection agreements for the relevant GSPs (Appendix G of the Bilateral Connection Agreement which is updated every month to capture new connections).

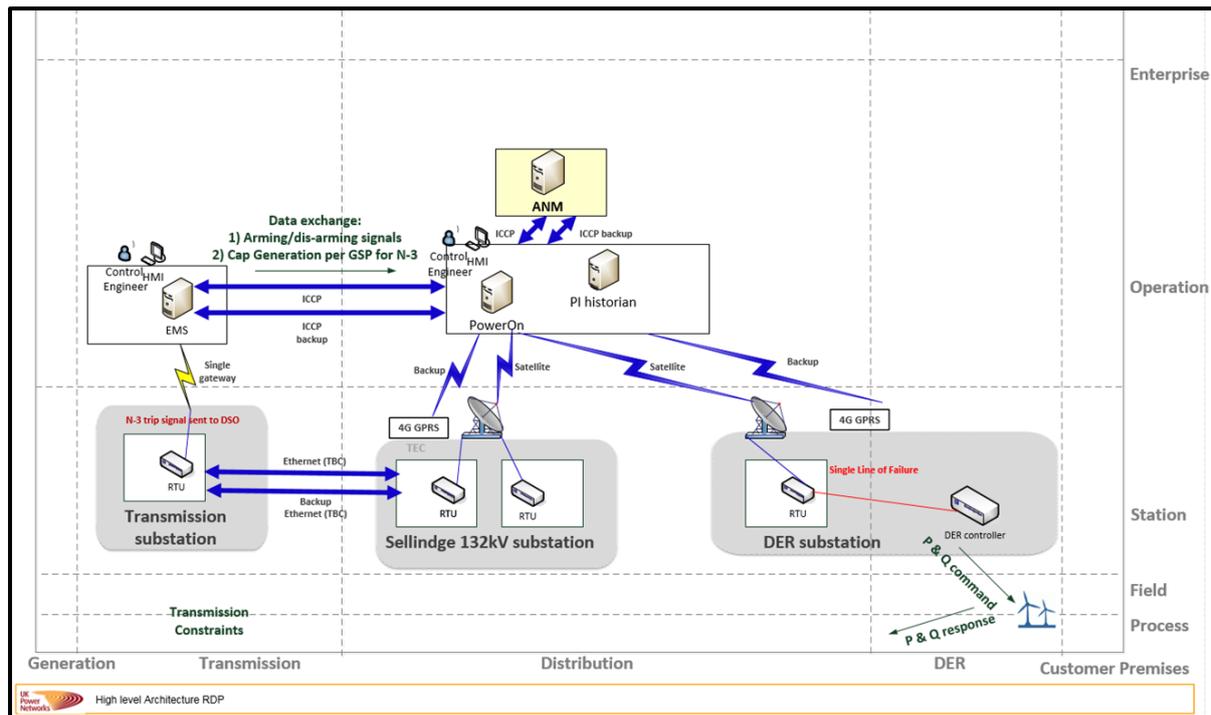


Figure 4 – UKPN OTS Scheme Architecture

The UKPN OTS architecture is illustrated on Figure 4. Co-ordination of the DNO OTS operation is being achieved by extending UKPN's Distribution Management System (DMS) PowerOn functionality.

Data Exchange from UKPN to NGENSO is via an ICCP Link. (There is an existing ICCP link between NGENSO and UKPN in the SPN license area.) UKPN will send the aggregated MW level of generation available to be tripped per GSP to NGENSO. Data will be sent on a near real time basis at an interval of 10 seconds. If the UKPN RTU metering data is not updated, a repetitive value will be sent.

Reduction in DER generation output will be achieved via SCADA through tripping of UKPN circuit breakers. PowerOn is also being configured to interact with ANM arrangements to ensure that the ANM system acts in line with the OTS requirements.

Considering the 4 key stages of the intertripping process – prior to arming, arming, tripping/triggering and disarm/restore:

Prior to Arming	UKPN will provide visibility of the DER controllable generation available to be curtailed at each GSP to NGENSO. NGENSO will monitor the outputs and system conditions.
Arming	NGESO identifies a possible N-3 event and requests UKPN for MW volumes to be available to be reduced per GSP. (PowerOn will not actually curtail any generation at this stage.) NGENSO will also instruct NGET to start monitoring circuits for fault outages.
Tripping/Triggering	If the relevant double circuit fault occurs, a trip signal will be sent from the NGET OTS to UKPN's DMS System (PowerOn). On receipt of the trip signal, PowerOn will have an agreed duration to reduce the generation to the cap level set at the arming stage. Currently the agreed timescale is 30 seconds.
Disarming/Restoring	When system conditions are back to normal, NGENSO will coordinate the process of resuming normal system operation.

Implementation & System Integration

Currently the OTS is being implemented on the South Coast where transmission constraints for certain N-3 conditions are either caused or exaggerated by increasing DER volumes. UKPN already have an ICCP link with NGENSO. NGET is working with UKPN to establish dedicated trip signal links from its Sellindge OTS system and, bar minor works, works are largely complete at Sellindge.

To date, a system simulation has been successfully carried out. A strategy to prove end-to-end capability has been agreed and testing should take place over the next 2-3 months. The OTS is targeted to go live in October 2020.

ii. OTS Scheme in SSEN Area

This OTS is being delivered through normal connection process arrangements using RDP concepts. It utilises a new transmission NGET OTS at Melksham and is intended to help secure transmission outages on the double circuit lines that support the South West and South Coast (Bramley-Fleet-Lovedean etc). The OTS will cover eight GSPs including Axminster, Botley Wood, Chickerell, Fawley, Fleet, Lovedean, Mannington and Nursling. The SSEN interface substation will be at Fleet and it is anticipated that upwards of 1000MW of DER resources will be available via the OTS arrangements.

The Appendix G process allows National Grid to set additional capacity limits at GSP sites, providing new generation can be controlled and curtailed in response to transmission network issues such as an N-3 scenario. This enables increased connection capacities at GSPs.

To provide the OTS functionality and control the new generation, SSEN are implementing a wide area ANM system which would present a T-D (Transmission to Distribution) interface, monitoring and control functions at generator sites and an overarching control mechanism to facilitate the trimming/tripping of generation across multiple sites to meet the requirements of the transmission network conditions. This system is known as the South West Active Network (SWAN) scheme. The SWAN scheme will interface with SSEN's DMS (PowerOn) to provide alarm and status indications for the OTS.

When the OTS is to be armed, NGENSO will notify SSEN via an ICCP link of the MW Cap per GSP. In the event of a transmission circuit trip, the NGET OTS sends trip signals to the SWAN system at Fleet for each GSP at which DER is to be deloaded.

SSEN's implementation of generator curtailment at each GSP is based on a LIFO approach. Signals are sent to selected DERs to ramp down to new generation set points. If this is not achieved within 25

seconds, a trip signal is sent to the DNO circuit breaker to ensure that the generation output is reduced within the agreed timescale of 30 seconds.

The architecture for this scheme is illustrated on Figure 5 below. A process diagram illustrating the interactions between NGESO, NGET, SSEN and the DER is shown in Appendix A.

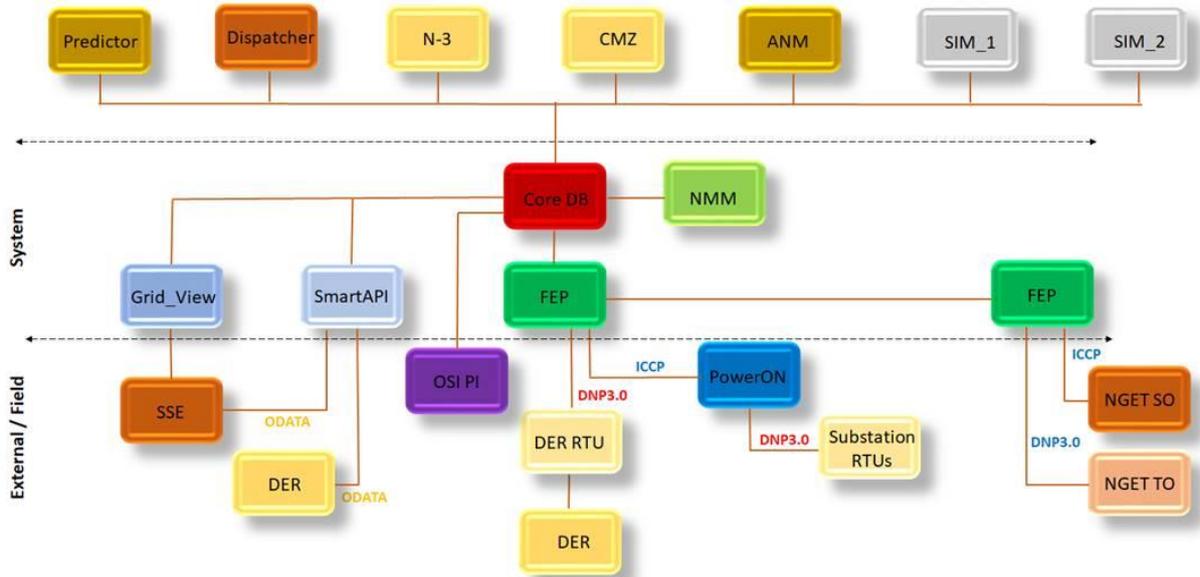


Figure 5 – SSEN OTS Scheme Architecture

Implementation & System Integration

With respect to progress, SSEN are completing installation of ANM software. ICCP and DCP3 links have been configured in readiness for testing. Test case development should begin in July 2020. Installation of OTS functionality at generator sites is scheduled to begin in August. By September 2020, N-3 functionality is to be complete across all 8 GSPs with interfaces to the Distribution Management System, the TO and the first two generator local ANM controllers completed.

Overall scheme completion is dependent on the ICCP cable installation. This will take around 12 months such that go-live is likely to be during summer 2021.

iii. OTS Scheme in WPD Area

This OTS is being delivered through the NGESO-WPD Regional Development Programme. It utilises the new transmission OTS at Melksham and is intended to help secure transmission outages on the 400kV double circuit routes that support the South West (Melksham-Hinkley Point-Taunton, Mannington-Chickerell-Exeter etc). The OTS will cover eight GSPs in the South West including Abham, Alverdiscott, Axminster, Bridgewater, Exeter, Indian Queens, Landulph and Taunton. The WPD interface substation will be at Taunton.

It is anticipated that upwards of 600MW of DER resources will be available via the OTS arrangements.

Co-ordination of the DNO OTS operation will be achieved by extending WPD’s PowerOn functionality. Deload or tripping of DER’s will be achieved either by utilising existing ANM arrangements, by direct control of DER where this has been established or through tripping WPD circuit breakers at DER sites.

Implementation & System Integration

This OTS is being delivered through the NGESO-WPD RDP. Work is ongoing with procurement almost complete. The ICCP implementation is close and is awaiting WPD approval.

Overall timescales are likely to be driven by completion of NGET’s works at Melksham. These have been delayed due to COVID-19 impacts and go-live for the OTS is anticipated around April 2021.

4 OTS Performance & Data Exchange Requirements

i. OTS Performance & Component Redundancy

This section considers the performance requirements of the OTS arrangement in more detail including the need to provide equipment redundancy to increase reliability.

Each OTS will only act on DER resources that that have agreed intertripping through connection agreements. The DER resources that are part of an OTS scheme might be tripped or ramped down to relieve thermal overloads on the transmission network. It is for the DNO to determine whether tripping or ramping is more appropriate. The timescale required to trip or download DER is 30 seconds from receipt of trip signal. So far, for the implementation of OTS schemes, UKPN and WPD are choosing to trip DER resources whereas SSEN is choosing to ramp down DER resources.

On the resilience of the OTS arrangements, no single hardware or software failure should lead to the loss of the OTS system. To achieve this objective, much of the OTS infrastructure is being built to be fully dual redundant such that a single control system or communications failure will not result in the whole system being unavailable. This includes having two ICCP communication links between NGESO and DNO which are separately routed between different NGESO and DNO locations.

The signalling and interfacing from NGET to DNOs is hard-wired to the interface substation. Dual channels are provided for the transmission signals and the interface to the DNO system (PowerOn or ANM) must also be robust against a single failure. This may require dual DNO RTUs at the interface site with separate electrical supplies, but other approaches are acceptable if a single failure can be secured. As the NGET OTS system interfaces to a single DNO site, 5m separation is required between the dual DNO interfaces. Where 5m separation can't be provided further review should be undertaken.

The exceptions to the dual redundancy approach are the control and communications links to individual DER sites from the DNO control system. These links and RTUs at DER sites are not duplicated due to cost benefit considerations. Instead, NGESO and DNOs will provide failsafe arrangements. For example, if a link is lost to a DER site, this is detected, and the DNO control system discounts the contribution of the generator.

A summary of the OTS performance and redundancy requirements is given in Figure 6.

OTS Element / Function	Equipment Owner	Dual Redundancy (Yes/No)	Comments (e.g. how redundancy is provided)
DER Monitoring to determine DER Available	DNO	No	DNOs to determine how DER is monitored and the frequency of updates to NGESO. Satellite and radio comms are being used.
DNO to ESO comms to notify available DER, arming req'ts etc	ESO	Yes	2 way comms are provided via ICCP. A back up ICCP link is provided on a separate route to the main link.
ESO-TO comms to notify circuit monitoring requirements	ESO/TO	Yes	Provided via existing NG IEMS system.
Transmission circuit monitoring and trip signal generation	TO	Yes	Provided by NGET protection arrangements.
TO-DNO interface substation comms to trigger DER tripping	TO	Yes	Trip signals are provided to the DNO interface substation from TO substations included in the OTS. Duplicate trip channels are in place.
TO-DNO interface substation requirement including RTU to receive and handle trip signal	DNO	Yes	At the DNO interface site, duplicate RTUs are provided.
DNO system to determine DER tripping/de-load requirements	DNO	Yes	Provided via DMS (PowerOn) or through separate ANM system (e.g. SWAN).
DNO system to send tripping/de-load requirements to DER	DNO	Yes	Provided via DMS (PowerOn) or through separate ANM system (e.g. SWAN).
DNO communication links to DER substations and RTUs	DNO	No	Dual redundancy is not provided due to cost. Other failsafe arrangements to be used.
DNO remote substation RTU to DER interface	DNO/DER	No	In some cases, DER deloading is achieved through circuit breaker trip, in some cases through revising the generator set point. Dual redundancy is not provided due to cost. Other failsafe arrangements to be used.

Figure 6 – Main OTS Elements and Redundancy Requirements

Cyber security has been considered as part of the OTS design. In particular, the control room to control room links use the Inter-Control Center Communications Protocol (ICCP) to link two secure, private networks. The NGESO-UKPN OTS utilises a previously established ICCP link. For the NGESO-WPD OTS, given the establishment of new control room links, the proposals have been shared with the National Cyber Security Centre (NCSC) for cyber security review and approval. The NCSC is reviewing the ICCP software and link deployment to ensure there is adequate data security. At the time of this report, the timescales for completing this review have yet to be finalised.

ii. OTS Data Exchange Requirements

A number of data points would be exchanged between NGESO, NGET and DNOs. At a high level:

- DNOs will share the levels of real time controllable DER behind each GSP with NGESO.
- NGET will share transmission outage and circuit status information with NGESO.
- NGESO will send arming and restore instructions to the DNOs and NGET.
- NGET will send trip signals to the DNO via a dedicated link.

Prior to Arming

The DNO will monitor DER and provide the aggregated MW level of DER generation per GSP that is available to be selected to the OTS scheme. Data will be sent on a near real time basis at an interval of 10 seconds. Data Exchange from the DNO to NGESO is via an ICCP Link.

Arming

NGESO sends an arming instruction to the DNO via ICCP Link. This instruction includes the capped generation level for each GSP.

NGESO also sends an instruction to NGET to arm the OTS scheme to produce trip signals in the event of particular transmission circuit trips. Data exchange from NGESO to NGET uses the IEMS system.

Tripping

If a fault occurs, the fault information and likely duration is sent from NGET to NGESO. After an actual N-3 event, NGET will wait 120 seconds before sending a trip signal to the DNO. This delay is to check if the fault is transient in nature.

Adjust/Disarm

Following a trip signal, the DNO control system adjusts MW generation at each GSP based on the capped generation level. The DNO systems should curtail DER on armed GSPs within 30 seconds.

If the OTS is to be disarmed, NGESO will provide an instruction to the DNO and NGET. The DNO control system will cancel the potential DER generation curtailment such that there are no capped values on the GSPs.

Stage	From	To	Data Exchanged	Comms	Further Detail
Prior to Arming	DNO	NGESO	Aggregated generation per GSP that is available to be selected to OTS.	ICCP	DER available for curtailment.
Prior to Arming	NGET	NGESO	Transmission circuit status.	IEMS	
Arming	NGESO	UKPN	Request for DER volumes to be armed and capped level of generation per GSP.	ICCP	This sets the capped DER levels per GSP.
Arming	NGESO	NGET	Request to monitor circuits and arm OTS.	IEMS	
Tripping	NGET	NGESO	Fault information and likely duration.	IEMS	Look to establish is the trip is transient or sustained.
Tripping	NGET	DNO	After 120 seconds. Trip signal from OTS to DNO control scheme.	Hard-wired	This is delayed to avoid tripping DER for a transient fault.
Tripping	DNO	DER	Signal to deload generation within 30 seconds of receiving NGET trip signal.		Could be a signal to deload DER by tripping circuit breakers or by revising generator set points.
Disarm	NGESO	DNO	Request to disarm DER volumes.	ICCP	
Disarm	NGESO	NGET	Request to disarm OTS scheme.	IEMS	
Disarm	DNO	DER	Within 30 seconds, signal to cancel generation curtailment.		
Cancel Trip	NGESO	DNO	Request DNO to stop curtailing after a trip event	ICCP	This is required as NGET OTS will not issue a cease signal after a trip event.

Figure 7 – Summary of Data Exchange Requirements for OTS

5 Standard Requirements / Differences Across Schemes

This section is to further draw out elements that are standard or different across the three OTS arrangements, emerging good practice and any problems identified to date.

i. Similarities & Differences across OTS Arrangements

The three 3 OTS's are compared in Figure 8.

	NGESO - UKPN	NGESO - SSEN	NGESO - WPD
OTS Coverage	South East / South Coast – 5 GSPs	South of England / South Coast - 8 GSPs	South West / South Coast - 8 GSPs
NGET OTS Scheme	Sellindge	Melksham	Melksham
Interface Substation to DNO	Sellindge	Fleet	Taunton Main
DNO Architecture / Control	DMS / PowerOn Being Extended	South West Active Network (SWAN) scheme.	DMS / PowerOn Being Extended
DER Type	Generation	Generation	Generation
DER Selection	LIFO	LIFO – there is some further selection based on ramp rates to ensure sufficient generation is deloaded.	LIFO
Performance	Trip to capped level or more within 30 seconds of trip signal.	Deload to capped level within 30 seconds of trip signal.	Trip to capped level within 30 seconds of trip signal.
DER Deload	Achieved via DNO circuit breaker tripping.	Achieved by ramp down to new set point within 25 seconds, then trip if this is not achieved.	Achieved by ramp down or by circuit breaker tripping depending on DER.
Dual Redundancy	All elements have dual redundancy bar the connections to DER sites.	All elements have dual redundancy bar the connections to DER sites.	All elements have dual redundancy bar the connections to DER sites.
Failsafe Arrangements	Utilise manual “work arounds” when DER visibility or control is lost.	Utilise manual “work arounds” when DER visibility or control is lost	Utilise manual “work arounds” when DER visibility or control is lost
System Restoration following OTS Trip Event	Restoration through manual actions.	Automated restoration.	Some automated restoration.

Figure 7 – Summary of Data Exchange Requirements for NGESO-UKPN OTS

The main differences between the 3 OTS arrangements currently being implemented by DNOs include:

- The SSEN system implements the distribution control requirements in its SWAN system rather than through extension of PowerOn.
- The SSEN system will attempt to deload generation by ramping this down to a new set point rather than trip the generation.

ii. Emerging Issues & Good Practice

The following points have been identified:

- Cyber security aspects should be considered and NCSC review of proposals to secure data transfers (e.g. ICCP) is likely to be required.
- DNO network running arrangements may lead to different distributions of DER across GSPs. SSEN are considering how to accommodate this within the design of its control system.
- NGESO, the TO and the DNO need to remain aware of OTS component availability and planned outages. For the NGESO-NGET-UKPN scheme, a “Standard Operating Protocol” is being developed for use by Operational Planners.

6 Data Transparency

The nature of the data being transferred to achieve the OTS arrangements is described in section 4 of this report. As the actual data transfers are real-time and rely on secure and dedicated communications links, wider dissemination of this data is not proposed.

7 Appendix A

Process diagram illustrating interactions between OTS parties



SSEN OTS Process v2.pdf

