DRAFT STCP MM-N Issue 0.4~~1~~ Active Network Management

STC Procedure Document Authorisation

Party	Name of Party Representative	Signature	Date
National Grid Electricity Transmission plc			
SP Transmission Plc			
Scottish Hydro Electric Transmission Plc			
Offshore Transmission Owners			

To be replaced by reference to STC Parties in new Schedule 1

STC Procedure Change Control History

Issue 001	dd/mm/2014	First Issue

1 Introduction

1.1 Scope

1.1.1 This procedure defines the interactions required between NGET and the TO(s) for the purpose of introduction and management of Active Network Management (ANM) schemes~~-~~.

1.1.2 This procedure describes the process for the agreement of the design requirements of ANM schemes and the subsequent verification that the operation of the ANM will discharge the responsibilities of the System Operator satisfactorily, including its functional performance.

1.1.3 NGET is responsible for System Operation and thus where the ANM scheme performs actions that would traditionally have been performed by the System Operator (SO) and thus the SO must accept ultimate responsibility for the actions of the ANM scheme.

1.1.4 Each TO is responsible for the design of the connection and the infrastructure of its Transmission System, including that of the monitoring, signalling and automated control systems therein.

1.1.5 This procedure applies to NGET and each TO.

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1.1.6 For the purposes of this document, the TOs are

SPT;

SHETL.

All Offshore Transmission Licence holders as appointed from time to time by the Authority

1.1.7 It is anticipated that ANM schemes would initially only be considered where inter-tripping would be too complex or impractical. Additionally, ANMs may be used to regulate generation highly congested areas of the network if a methodology where the apportionment of TEC between affected generators has been agreed.

Comment [KD1]: CUSC 4.2A refers

1.1.8 ANM schemes would normally be employed to manage enduring operation of generators but may also be used to manage shorter term conditions that may apply in advance of network reinforcement.

Comment [KD2]: Potential outturn of management of queue of generator application

1.1.9 An ANM scheme developed in accordance with this procedure would not perform any predictive functions as these would be carried out within the Energy Balancing System owned by the NGET. This would be reviewed periodically as the technology advances.

1.1.10 An ANM scheme may be proposed by a TO to facilitate connection of generation or by NGET to manage system constraint issues. Where generation constraints may be a determinant in the suitability of an ANM scheme, an estimation of that cost shall be provided by NGET.

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1.2 Objectives

~~1.2.1~~ The objective of this procedure is to detail:-

1.2.1 how the TO(s) and NGET will agree the initial design requirements of an ANM scheme

1.2.2 how the TO(s) and NGET will agree the final design of an ANM scheme

1.2.3 how the TO(s) and NGET will agree the final testing and commissioning of an ANM scheme

1.2.4 how updates to the design of an ANM scheme will be implemented as a result of operational issues, network changes, connection of new generation etc

1.2.5 the operational lines of communication to be used

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2 Key Definitions

2.1 For the purposes of this STCP:

2.1.1 An ANM scheme is a system which manages generator outputs such that circuit loading in steady state pre and post-fault conditions are managed within agreed limits.

~~2.1.1~~2.1.2 **Type 1: ANM(Distribution)** means an Active Network Management scheme that only acts on plant within the Distribution Network Operator's (DNO's) system~~.~~.

~~2.1.2~~2.1.3 **Type 2: ANM(Local, Non BM)** means an Active Network Management scheme that acts on plant ~~within a~~on the Network Operator's side of Grid Supply Point busbars ~~and~~ but regulates power flows on the Transmission System. This scheme will not act upon generators within the Balancing Market.

~~2.1.3~~2.1.4 **Type 3: ANM(Local, BM)** means an Active Network Management scheme that acts on plant on the Network Operator's side of ~~within a~~ Grid Supply ~~Point~~ Point busbars and regulates power flows on the Transmission System. This scheme would act upon generators within the Balancing Market.

~~2.1.4~~2.1.5 **Type 4: ANM(Wider, BM)** means an Active Network Management scheme that acts on plant within a Transmission group or behind a Transmission system boundary including generators within the Balancing Mechanism and does regulate power flows on the Transmission System.

~~2.1.5~~2.1.6 **ANM Steering Group** means a team made up of named representatives from NGET, Host TO, Affected TO and other Affected TOs as appropriate within the Boundary of Influence. The ANM Steering Group shall be formed to oversee the design, development and implementation of ANM schemes including the overall programme. It shall be responsible for resolving any disagreements that may occur at their first instance in order that escalation may be minimised. Dialogue shall take place in person, by e-mail, telephone or video conference as appropriate whether relating to individual or multiple schemes.

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Comment [KD3]: This is the only formal mechanism that we have to identify 'Affected TOs.

3 Procedure

3.1 Setting of ANM Design Requirements

3.1.1 It is anticipated that the agreement of outline design requirements would ~~not~~ necessarily take place within the 3 month generation application timescale. This shall be the responsibility of the TO but NGET as SO shall be consulted in cases where generators within the Balancing Market may be impacted. In these cases, once a functional specification has been agreed within the TO this shall be submitted to NGET for approval. NGET shall respond in accordance with the timetable in Appendix A. NGET will liaise with the TO if changes are required to ensure that its obligations as System Operator would be discharged fairly and economically. The detailed design of the ANM would not take place until consents have been obtained for the affected project and on a timescale agreed between the TO and NGET.

~~3.1.1~~3.1.2 When required, ~~T~~the ~~design~~ functional specification of a specific ANM scheme~~s~~ shall ~~be such that~~detail performance in the event of loss of communication between the ANM and generator(s) or maloperation of the ANM that the generator(s) output shall ramp down to zero, or a pre-determined level, over an agreed and pre-determined period. In the case of an ANM acting upon an interconnected section of network, the provision of an acceptable post-event generation output value taking due cognizance of voltage issues circuit loading shall also be considered.

~~3.1.2~~3.1.3 The ANM scheme shall provide agreed alarm/status indications to the IEMS.

~~3.1.3~~3.1.4 Common mode failures of ANM schemes and their ancillary equipment shall be eliminated as far as is economically possible.

~~3.1.4~~3.1.5 Consideration shall be given to avoidance of spurious overload alarm creation in the SO Control Room by the incorporation of damping and allowance for metering-tolerances into the ANM design.

3.2 Interface of ANM Scheme with the SO Energy Balancing System

3.2.1 It is anticipated that ANMs of Type 3 and Type 4 would facilitate an interface with the NGET Energy Balancing System (EBS) whether this is direct or indirect via an~~d~~ interface unit. The technical requirements of the interface shall be specified and agreed in advance of detailed ANM design.

3.3 Approval of ANM Design

3.3.1 In applicable cases, namely Types~~,~~ 2, 3 and 4, once a design has been finalised this shall be submitted to NGET for approval. NGET shall respond in accordance with the timetable in Appendix A. NGET will liaise with the TO if changes are required to ensure that its obligations as System Operator would be discharged fairly and economically.

~~3.3.1~~3.3.2 The content of the Design Specification shall comprise of the following as a minimum:-

~~3.3.1.1~~3.3.3 Block/functional diagram and detailed description of modes of operation

~~3.3.1.2~~3.3.4 Fall-back modes of operation in the event of communication failure and timescale of action

~~3.3.1.3~~3.3.5 Generation plant~~s~~ within scope

~~3.3.1.4~~3.3.6 Circuits monitored for loading

~~3.3.1.5~~3.3.7 Fall-back modes of operation in the event of ANM failure and timescale of action

3.3.8 Generation ranking order input requirements (if applicable)

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Comment [KD4]: Dertailed design at long term timescale would be wasteful of effort as this would be likely to change.

Comment [KD5]: EG regional loss of metering/SCADA

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Comment [KD6]: Ie two way communication may be required

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~~3.3.1.6~~3.3.9 Targets for reliability and mean time between failures of the ANM, including associated systems (eg Communications and SCADA)

~~3.3.1.7~~3.3.10 Duplication of systems to improve reliability

~~3.3.1.8~~3.3.11 Manual override facilities if required/applicable

~~3.3.1.9~~3.3.12 Potential for extension of ANM Scheme

~~3.3.1.10~~3.3.13 Planned unavailability for maintenance; including frequency and duration

~~3.3.1.11~~3.3.14 Fault rectification methodology including anticipated timescales.

3.3.15 In the event of dispute, resolution shall be obtained by reference to the Joint Planning Committee.

~~3.3.1.12~~3.3.16 Demonstrate that due consideration has been given to the application of Demand Control and to system frequency containment.

3.4 Approval of ANM Algorithm

3.4.1 On completion of the design process, the TO shall submit the algorithm to NGET for approval of its functionality with respect to the operational expectations placed on the System Operator in its duty to manage generation in an economic, efficient and coordinated manner.

3.4.2 Any issues shall be resolved between NGET and the TO.

3.4.3 In the event of dispute, resolution shall be obtained by reference to the Joint Planning Committee

3.5 Communication of ANM Implementation to Affected Parties

3.5.1 Generators would be informed through the mechanisms of STCP18-1.

3.5.2 Network Operators would be informed via the Joint System Development Liaison group under STCP16-1.

3.6 Life Cycle of ANM Scheme

3.6.1 Conception

3.6.2 Design and Development

3.6.2.1 At this stage the algorithm will be developed and approved by means of liaison between the TO and NGET.

3.6.3 Factory Acceptance Test

3.6.4 Commissioning and Site Acceptance Testing

3.6.4.1 STCP19-4 refers

3.6.5 Production

3.6.6 Decommissioning

~~3.4.3~~3.6.6.1 STCP19-4 refers

Comment [KD7]: Need to avoid common mode failure that could remove large tranche of generation from the system. **Software reliability??**

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Comment [KD8]: Initiation (K Stott)? Is this simply sub-contracting by the TO.

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Comment [KD9]: Do we need to formalise a process/documents to manage this?

~~3.5~~3.7 Commissioning of ANM Scheme

~~3.5.1~~3.7.1 Commissioning shall be carried~~s~~ out in accordance with the process detailed in STCP19-4 Commissioning and Decommissioning.

~~3.5.2~~3.7.2 In the event of dispute, resolution shall be obtained by reference to the Joint Planning Committee

~~3.6~~3.8 Modification of ANM Scheme

~~3.6.1~~3.8.1 In the event of a change in network topology or connected generation an existing ANM scheme may need to be amended accordingly. In such cases the same logical sequence of actions shall be taken as previously detailed in this document. The actual process to be followed in a specific case shall be agreed by the ANM Steering Group.

~~3.7~~3.9 ANM Steering Group

~~3.7.1~~3.9.1 In order that ANM schemes may be expedited in an timely and efficient manner the ANM Steering Group shall be convened

4 Subsidiary Processes

4.1 Definition of Interface Requirements between EBS and TO ANM Systems ~~excluding~~ ANMs

4.1.1 NGET shall ~~define~~ agree the interface protocol to/from the EBS such that ANMs shall be designed to interface in a standard way or use a suitable intermediate device.

4.2 Notification of Users of Material Changes in ANM Functionality

4.2.1 Should material changes in the action of a specific ANM scheme be necessary, NGET shall advise the generator of the nature and reason for change.

5 Responsibilities of the Parties

5.1 Design Phase

5.1.1 During the conceptualisation and design phase the ANM scheme shall be the responsibility of the host TO.

5.2 Production Phase

~~4.2.1~~5.2.1 During the production phase, the maintenance and availability of the ANM and its subsidiary communication and control system shall be the responsibility of the TO. Once adopted by NGET, the functionality of the algorithm within the ANM shall be the responsibility of NGET, but any shortfall in performance against its specification would remain the responsibility of the TO.

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Comment [KD10]: Eg If more generation is connected in the group and the ramp rate of reduction in a post-fault scenario needed to be greater.

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Comment [KD11]: Reasoning for this is that if the TO were to opt for an asset based solution then the asset choice would be their responsibility

Comment [KD12]: Once NGET is happy with the design it should operate as specified and do the task anticipated. If it doesn't the TO should rectify this.

Appendix A: Information Exchange Timetable

TO Active Network Management Scheme

All day references are working days

ITEM	ACTIVITY	SOURCE	TARGET TIMESCALE
1	Functional Specification submission to NGET	TO	Phase 1 day1
2	Functional Specification approval by NGET	NGET	Phase 1 day 15 unless otherwise agreed
3	Design Specification submission to NGET	TO	Phase 2 day 1
4	Functional Specification approval by NGET	NGET	A) Phase 2 day 25 Category 1 ANM B) Phase 2 day 50 Category 2, 3 and ~~4~~3 ANM
5	Algorithm submission to NGET	TO	Phase 3~~2~~ day 1
6	Algorithm approval by NGET	NGET	A) Phase 3~~2~~ day 25 Category 1 ANM B) Phase 3~~2~~ day 50 Category 2, 3 and ~~4~~3 ANM
7	Commissioning Plan	TO	In accordance with STCP19-4
8	Revision to existing ANM	TO	Depending on type of revision use timetable above as agreed between parties
9			

Appendix B: Abbreviations & Definitions

Abbreviations

BM	Balancing Mechanism
Other Affected TO	Other Affected Transmission Owner
SCADA	Supervisory Control And Data Acquisition
SHETL	Scottish Hydro-Electric Transmission Limited
SPT	SP Transmission Limited
TO	Transmission Owner

Definitions

STC definitions used:

NGET

Transmission Owner

Transmission System

Definitions used from other STCPs:

Joint Planning Committee	As defined in STCP16-1 Investment Planning
Boundary of Influence	As defined in STCP22-1 Production of Models for NETS System Planning