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National Grid

National Grid
Technical
Specification

Operational Tripping

NGTS 3.24.64
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OPERATIONAL TRIPPING

FOREWORD

This specification is a functional specification within the Substation Information, Control and Protection suite of technical specifications.

1 SCOPE

This specification defines the generic technical requirements for Operational Tripping Schemes (OTS). Scheme specific technical requirements will be separately defined within an OTS Scheme Functional Requirements Specification and this should be read in conjunction with this specification. Unless specified otherwise, all requirements of this specification shall apply.

Traditionally, OTS schemes have been associated with generator tripping in response to specified system events such as circuit faults. However, the term "Operational Tripping" is also associated with schemes that perform actions other than circuit breaker or generator tripping. Examples of these other actions include closing circuit breakers and performing power flow control actions on DC links.

To facilitate use of this specification, Figure 1 shows a generic functional overview of an OTS scheme.

Other scheme specific technical requirements will be defined by separate specifications, as detailed in Appendix A, which should be read in conjunction with this specification.

2 REFERENCES

NGTS - 2.24 - Substation Information, Control, Protection and Metering.

NGTS 3.24.2 - Substation Information Management Unit (IMU).

NGTS 3.24.4 - Hardware Platform.

NGTS 3.24.36 – Teleprotection (Command Based).

3 DEFINITIONS AND ABBREVIATIONS

OTS – Operational Tripping System.

OTS Scheme Functional Requirements Specification – this document defines the scheme specific functional requirements.

OTS Scheme Rules - An operational tripping scheme will operate to a set of operating rules that determine the action of the scheme in response to power system events and states. An example rule could take the following general form - if the power system is in state S_n and event E_m occurs then action(s) A_p shall occur after elapsed time T_q . In operation, the scheme operator will select which of the total set of rules will be active or inactive. The information defining which rules are active or inactive are contained within Operating Rule Selection Sets.

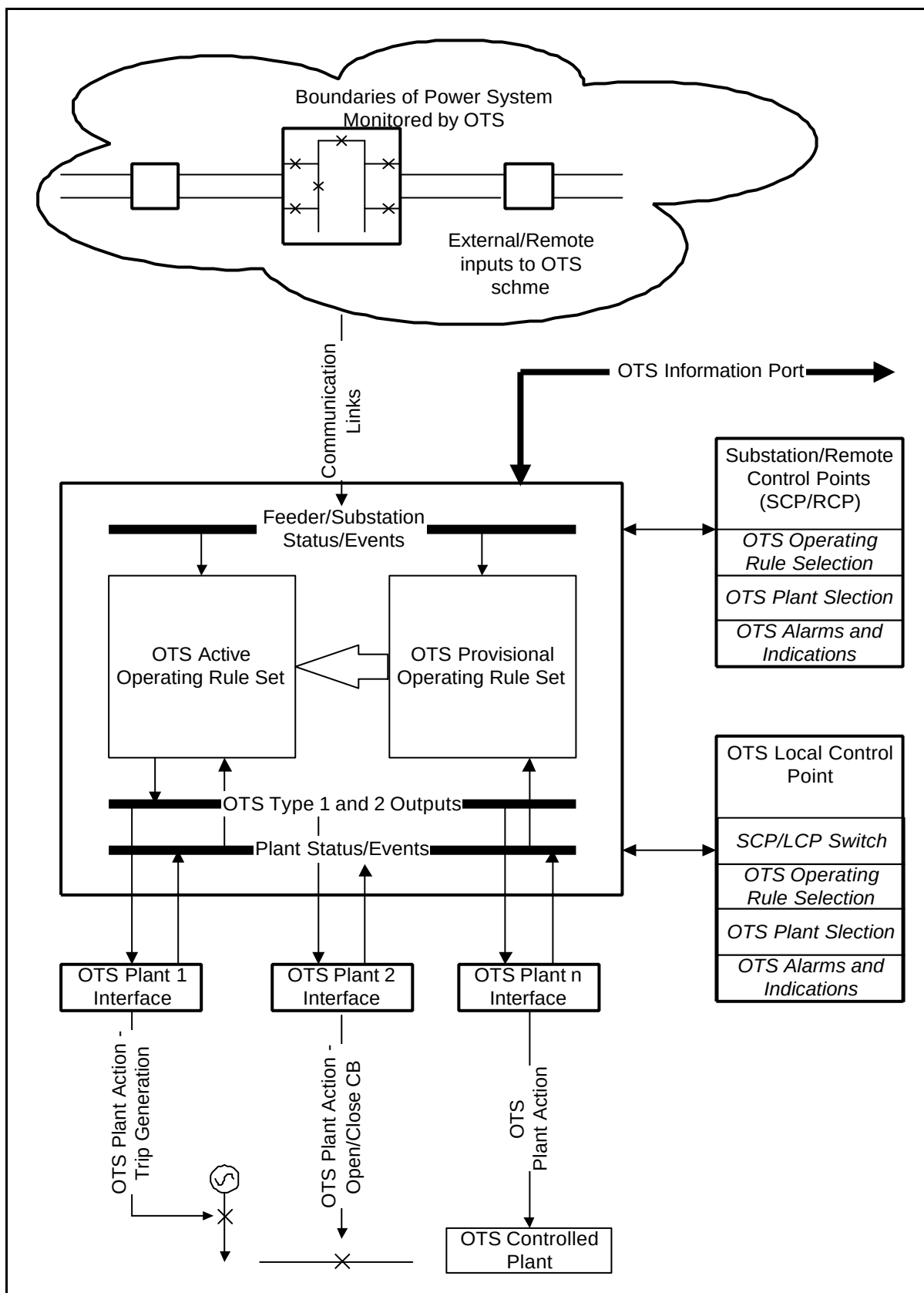


Figure 1: OTS Functional Definition Scheme Overview

4 SCHEME SPECIFIC OPERATIONAL REQUIREMENTS

- 4.1 The operational tripping scheme shall trip generation, operate plant or perform other control action(s) in accordance with the operating rules and performance requirements defined by the OTS Scheme Functional Requirements Specification that will be defined/agreed by National Grid.

5 POWER SYSTEM MONITORING

- 5.1 The operational tripping scheme shall collect all required power system information (feeder status, substation connectivity, analogue measurements, generator status etc) required by the schemes operating rules.

Feeder Connectivity Status

- 5.2 When the operating rules for the scheme require feeder status then the connection status of all ends of the feeder shall be monitored.
- 5.3 For double busbar connected circuit ends, circuit breaker position indications shall be monitored to determine circuit end connectivity to its associated busbar.
- 5.4 At mesh stations, both mesh corner circuit breakers and associated disconnector position indications shall be monitored to determine circuit end connectivity.

Informative: At a mesh station a feeder can remain in service while one of the mesh corner circuit breakers is out of service for maintenance etc. While out of service the circuit breaker may present plant status conditions that could result in incorrect OTS operation. To prevent this facilities shall be provided that allow circuit breaker plant status to be temporarily overridden.

- 5.5 At mesh stations provision shall be made to allow mesh circuit breaker positions to be overridden during periods of circuit breaker maintenance.
- 5.6 At single switch stations where it is necessary to distinguish between the two circuits, all feeder and mesh corner protection operations, line disconnector and bus section circuit breaker positions at the station shall be monitored to determine circuit end connectivity.
- 5.7 At single switch stations where it is not necessary to distinguish between the two circuits then the bus section circuit breaker position shall be monitored.
- 5.8 Where analogue indications are used to determine the service status of a circuit, then both voltage and current measurements shall be used to determine circuit status.
- 5.9 Voltage and current VT/CT inputs shall be supervised.

Substation Connectivity

- 5.10 When the operating rules for the scheme require substation connectivity information, then all switchgear open/closed status information, and if required circuit breaker trip operations, that form part of the total set of possible connection paths shall be monitored to determine connectivity status between specified nodes.

Switchgear Open/Closed Indications

Informative: Switchgear open/closed indications need to be monitored when feeder and substation connectivity status information is required.

- 5.11 Switchgear position indications shall be derived from complementary double point indications.
- 5.12 While switchgear indications indicate DBI then the switchgear shall be assumed to be in the last known state while the DBI condition persists or the DBI condition has been manually overridden by the operator.