



Technical Specification 48-6-7

Issue 2 2013

Communications services for teleprotection systems

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Amendments since publication

Issue	Date	Amendment
Issue 2	December, 2013	<p>Minor revision of Issue 1 Amendment 1 to reflect updates in the references.</p> <p>This issue includes the following principal technical changes.</p> <p>Clause 5.2 Power supplies:</p> <p>New requirement for PTO service of any Category to be resilient in the event of a Black Start event and be capable of operating independently of mains electricity supplies for up to 72 hours.</p> <p>“complete mains failure” changed to “localised mains failure”.</p> <p>Note added referencing proposed new Engineering Recommendation on ‘Resilient Telecommunications’ (under development at the time of preparing this document).</p> <p>Details of all other technical, general and editorial amendments are included in the associated Document Amendment Summary for this Issue (available on request from the Operations Directorate of ENA).</p>

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Foreword

This Technical Specification (TS) is published by the Energy Networks Association (ENA) and comes into effect from the date of publication. It has been prepared under the authority of the ENA Engineering Policy and Standards Manager and has been approved for publication by the ENA Electricity Networks and Futures Group (ENFG). The approved abbreviated title of this engineering document is “ENA TS 48-6-7”.

This document replaces and supersedes Technical Specification 48-6-7 Issue 1 Amendment 1 February 2008.

This specification describes the functional and performance requirements for communication services to be used by the following teleprotection systems.

- Analogue Comparison Systems as defined in IEC 60834-2.
- Command Systems as defined in BS EN 60834-1.

Where the term “shall” is used in this document it expresses a requirement. The term “may” is used to express permission. The term “should” means the provision is a recommendation.

Commentary, explanation and general informative material is presented in smaller type, and does not constitute a normative element.

1 Scope

This Specification describes the functional and performance requirements for communication services to be used by the following teleprotection systems:

- Analogue Comparison Systems as defined in IEC 60834-2.
- Command Systems as defined in BS EN 60834-1.

In addition to the common clauses, 3 categories of performance are defined to enable the engineer to match the performance characteristics of the communications service with the overall performance requirements of the protection system.

The Specification covers inter-substation communication only.

The Specification defines the teleprotection requirements for the following types of channel:

- Four wire, voice frequency presented channels (non power-line carrier).
- Digitally presented channels including PDH (plesiochronous digital hierarchy) and SDH (synchronous digital hierarchy).

2 Normative references

The following referenced documents, in whole or part, are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Standards publications

BS EN 60834-1:2000, *Teleprotection equipment of power systems. Performance and testing. Command systems*¹

IEC 60834-2:1993, *Performance and testing of teleprotection equipment of power systems - Part 2: Analogue comparison systems*

IEC 62843:2013, *Standard for N times 64 kilobit per second optical fiber interfaces between teleprotection and multiplexer equipment*²

Other publications

[N1] ENA ER S37:2007, *Code of Practice for the Safe Working on Pilot, Auxiliary and Communication Cables*

[N2] ITU-T G712:2001, *Transmission performance characteristics of pulse code modulation channels*

[N3] ITU-T G704:1998, *Synchronous frame structures used at 1544, 6312, 2048, 8448 and 44 736 kbit/s hierarchical levels*

¹ BS EN 60834-1 is identical to IEC 60834-1:1999.

² IEC 62843:2013 is the same as IEEE C37.94: 2002, *Standard for N Times 64 Kilobit Per Second Optical Fiber Interfaces Between Teleprotection and Multiplexer Equipment*.

[N4] ITU-T G703:2001, *Physical/electrical characteristics of hierarchical digital interfaces*

[N5] ITU-T X21:1992, *Interface between data terminal equipment and data circuit-terminating equipment for synchronous operation on public data networks*

[N6] ITU-T G823:2000, *The control of jitter and wander within digital networks which are based on the 2048 kbit/s hierarchy*

[N7] ITU-T G821:2002, *Error performance of an international digital connection operating at a bit rate below the primary rate and forming part of an Integrated Services Digital Network*

[N8] ENA TS 48-5:2010, *Environmental test requirements for protection and control equipment and systems*

[N9] ENA ER G91:2012, *Substation Black Start Resilience*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

BER

Bit Error Ratio

number of bit errors divided by the total number of transferred bits during a studied time interval

3.2

communication service or communication link

total mechanism/equipment by which information is conveyed between two points

NOTE: It may comprise one or more types of bearer and provide one or more communication channels (see 3.4) together with interfacing equipment located within the Electrical Utilities Company (EUC) substations.

3.3

communication bearer

physical entity which propagates the communication signals

NOTE: It may form part or comprise all of the communication link or service

3.4

communication channel

part of the communication link or service which is dedicated to the conveyance of information (in both directions) for a single prescribed protection function

NOTE: One medium may support more than one channel by the use of time division, frequency division or wavelength division multiplexing techniques.

3.5

differential delay

difference between the absolute values of go and return path propagation delay

NOTE: It is caused by delay asymmetry in the go and return path of a particular channel.