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Open Radio equipment Interface (ORI); Requirements for Open Radio equipment Interface (ORI) (Release 4)

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Reference

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Keywords

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Foreword

This Group Specification (GS) has been produced by ETSI Industry Specification Group (ISG) Open Radio equipment Interface (ORI).

The contents of the present document are subject to continuing work within the ISG. Should the ISG modify the contents of the present document, it will be re-released by the ISG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit indicates the release number of ORI specification group starting from Release 1.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

Modal verbs terminology

In the present document **"shall"**, **"shall not"**, **"should"**, **"should not"**, **"may"**, **"may not"**, **"need"**, **"need not"**, **"will"**, **"will not"**, **"can"** and **"cannot"** are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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Introduction

Mobile communication networks have evolved from 1st generation to 3rd, and now, many operators are preparing to introduce LTE. Economical and efficient deployment of base stations is one of key issues for the success of mobile services. Operators also consider ecological aspects when renewing a system.

In general mobile radio base stations consist of a BaseBand Unit (BBU) and a Radio Frequency Unit (RFU), which usually is a Remote Radio Head (RRH) in a distributed base station architecture.

Current interfaces between BBU and RRH are provided in a "semi proprietary" nature, although based on industry standards like CPRI or OBSAI. In order to gain flexibility operators are looking for distributed base station architectures with separate BBUs and RRHs. In order to gain interoperability, BBU and RRH are interconnected via an open BBU-RRH Interface (ORI) for flexible combination from different vendors.

ORI is about a digitized radio base station interface that establishes a connection between "Radio Equipment Control" (REC) and "Radio Equipment" (RE) enabling single-hop and multi-hop topologies. Different information flows (User Plane data, Control and Management Plane data, and Synchronization Plane data) are multiplexed over the interface. ORI covers OSI protocol layer 1, Layer 2 up to Layer 7.

The present document aims to define a set of system and link requirements that apply to the Open Radio equipment Interface (ORI).

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1 Scope

ETSI Group Specifications (GS) are deliverables produced by Industry Specification Groups (ISG). GSs are written with the style of a Technical Specification (TS), and represent the sole view of the ISG members.

The present document describes system-level requirements that apply to the Open Radio equipment Interface (ORI) and ORI nodes for Release 4.

NOTE: Requirements comply with CPRI specification of CPRI forum [1] and focuses on the following 3GPP radio access technologies namely UTRA-FDD [3], [4] and [5], E-UTRA-FDD [6], E-UTRA-TDD [6] and GSM [12]. Multiplexing between any combination of UTRA-FDD, E-UTRA-FDD, and GSM on an ORI link is also considered.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are necessary for the application of the present document.

[1] "Common Public Radio Interface (CPRI); Interface Specification" V 6.0.

NOTE: Available at <http://www.cpri.info/spec.html>.

[2] ETSI GS ORI 002-1: "Open Radio equipment Interface (ORI); ORI Interface Specification; Part 1: Low Layers (Release 4)".

[3] ETSI TS 125 104: "Universal Mobile Telecommunications System (UMTS); Base Station (BS) radio transmission and reception (FDD) (3GPP TS 25.104)".

[4] ETSI TS 125 215: "Universal Mobile Telecommunications System (UMTS); Physical layer; Measurements (FDD) (3GPP TS 25.215)".

[5] ETSI TS 125 133: "Universal Mobile Telecommunications System (UMTS); Requirements for support of radio resource management (FDD) (3GPP TS 25.133)".

[6] ETSI TS 136 104: "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception (3GPP TS 36.104)".

[7] ETSI GS ORI 002-2: "Open Radio equipment Interface (ORI); ORI Interface Specification; Part 2: Control and Management (Release 4)".

[8] ETSI TS 125 461 (V10.2.0): "Universal Mobile Telecommunications System (UMTS); UTRAN Iuant interface: Layer 1 (3GPP TS 25.461 version 10.2.0 Release 10)".

[9] ETSI TS 125 462 (V10.1.0): "Universal Mobile Telecommunications System (UMTS); UTRAN Iuant interface: Signalling transport (3GPP TS 25.462 version 10.1.0 Release 10)".

[10] ETSI TS 125 466 (V10.3.0): "Universal Mobile Telecommunications System (UMTS); UTRAN Iuant interface: Application part (3GPP TS 25.466 version 10.3.0 Release 10)".

- [11] Antenna Interface Standards Group, Standard No. AISG v2.0, 13th June 2006: "Control interface for antenna line devices".
- [12] ETSI TS 145 005: "GSM/EDGE Radio Access Network; Radio transmission and reception (3GPP TS 45.005)".
- [13] ETSI TS 136 141: "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) conformance testing (3GPP TS 36.141)".

2.2 Informative references

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

Not applicable.

2.3 Document structure of the ORI specifications

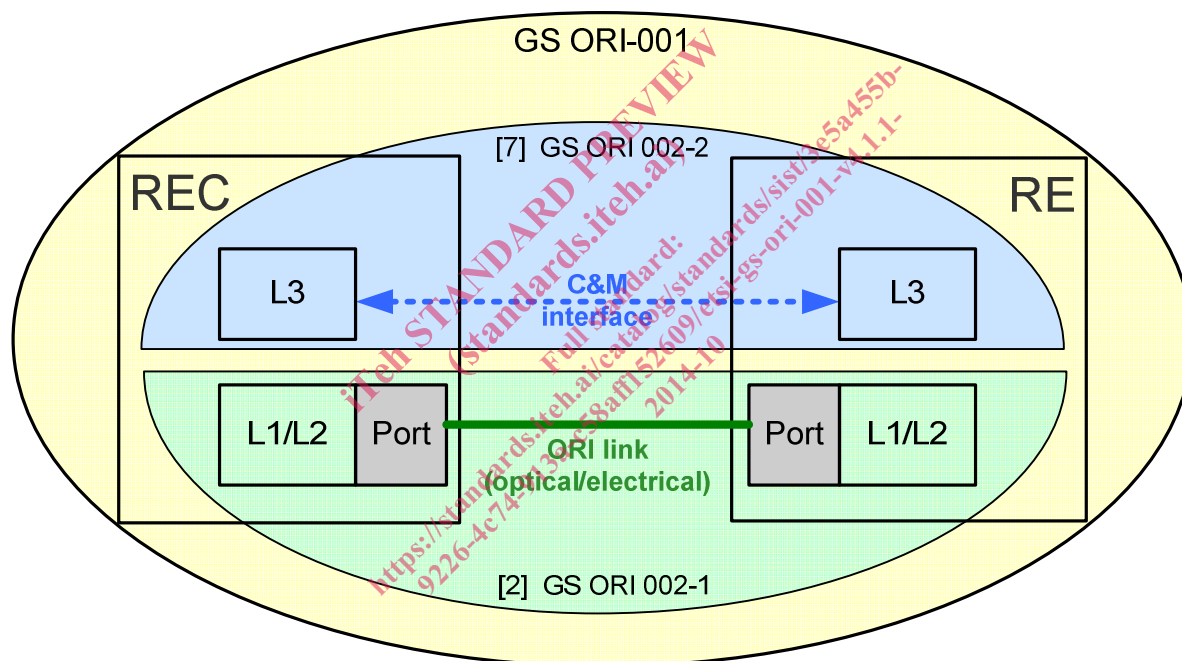


Figure 2.3.1: Document structure of the ORI specifications

NOTE: The Low Layers specification [2] covers a single ORI link. The C&M specification [7] covers C&M communication between one REC and one RE. The present requirements specification covers a system configuration of multiple ORI links between one REC and one or multiple REs and optionally additional subsequent ORI links between those REs and other REs.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

active link: ORI link that supports at least one C&M signalling channel

antenna line device: See [11].

downlink: direction from REC to RE for a logical connection

hop: aggregation of all ORI links directly connecting two ORI nodes

logical connection: interconnection between a particular SAP belonging to a port of the REC and the corresponding peer SAP belonging to a port of one particular RE and builds upon a single hop, or a multi-hop connection, between the REC and that particular RE

NOTE: Logical connections for C&M data, user plane data and synchronization can be distinguished.

master port and slave port: See section 2.1 in [1].

multi-hop connection: set of continuously connected hops starting from the REC and ending at a particular RE including REs in between

networking RE: RE with at least one ORI Port in master role

ORI link: bidirectional interface in between two directly-connected ORI ports, on two ORI nodes

NOTE: A working link consists of a master port and a slave port.

ORI node: subsystems REC and RE are also called ORI nodes, when either an REC or an RE is meant

ORI port: master port or slave port on an REC or an RE

passive link: ORI link that does not support any C&M channel

protocol data planes: the following data flows are discerned:

- **Control and Management (C&M) Plane:** Control data flow used for call processing while the management data flow is for the operation, administration and maintenance of the ORI link and the nodes. The control plane and management plane are mapped to a Service Access Point SAP.
- **User Plane:** Data that has to be transferred from the radio base station to the mobile station and vice versa. These data are transferred in the form of IQ data. Several IQ data flows are sent via one physical ORI link. Each IQ data flow reflects the data of one antenna for one carrier.
- **Synchronization:** Data flow which transfers synchronization and timing information between nodes.

Service Access Points (SAP): See section 2.4 in [1].

subsystems: radio base station system is composed of two basic subsystems, the radio equipment control and the radio equipment

uplink: direction from RE to REC for a logical connection

NOTE: For any terms used in the present document that are not defined either here or directly in the section in which they are used, refer to [1].

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

3GPP	3 rd Generation Partnership Project
AISG	Antenna Interface Standards Group
BBU	BaseBand Unit
C&M	Control and Management
CPRI	Common Public Radio Interface
E-UTRA	Evolved UMTS Terrestrial Radio Access
FDD	Frequency Division Duplex
GSM	Global System for Mobile communications (Groupe Spécial Mobile)
IQ	In-phase data and Quadrature data
O&M	Operation and Maintenance
OBSAI	Open Base Station Architecture Initiative
ORI	Open Radio equipment Interface

OSI	Open Systems Interconnection
RE	Radio Equipment
REC	Radio Equipment Control
RFU	Radio Frequency Unit
RRH	Remote Radio Head
SAP	Service Access Point
TDD	Time Division Duplex
UTRA	UMTS Terrestrial Radio Access

4 ORI system requirements

4.1 Reference configurations

4.1.1 Topology

The following networking topologies shall be supported by the present release of the ORI interface:

For single-REC single hop:

- Single point-to-point link between one REC and one RE (figure 4.1.1).
- Multiple point-to-point links between one REC and one RE (figure 4.1.2).
- Multiple point-to-point links between one REC and several REs (Star topology) (figure 4.1.3).

For single-REC multi-hop:

- Chain (figure 4.1.4).
- Tree (figure 4.1.5).
- Ring (figure 4.1.6).

For single-REC multi-hop topologies, the specification shall be designed to support the following:

- both the "simple solution" and "general solution" for networking, as described in section 6.3 of [1], including:
 - the capability for the line bit rate used on ORI links to be different across different hops;
 - the capability for data to be transported via AxCs mapped to M slave ports to be able to be switched by the networking RE to/from N master ports, where $M \neq N$.

The capability for the REC to configure an RE that is connected to the REC via a networking RE without affecting radio interface transmission on the networking RE, and vice versa.



Figure 4.1.1: Single point-to-point link between one REC and one RE

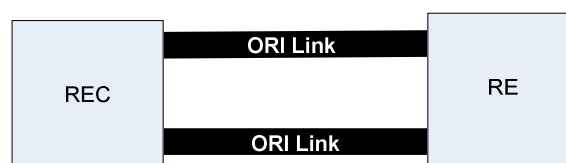


Figure 4.1.2: Multiple point-to-point links between one REC and one RE