

O-RAN Working Group 2 (Non-RT RIC and A1 interface WG)

A1 interface: Transport Protocol

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Revision History

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Chapter 1 Introductory Material

1.1 Scope

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Release xx.yy.zz

where:

- xx the first two-digit value is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc. (the initial approved document shall have xx=01).
- yy the second two-digit value is incremented when editorial only changes have been incorporated in the document.
- zz the third two-digit value is included only in working versions of the document indicating incremental changes during the editing process; externally published documents never have this third two-digit value included.

The present document specifies the transport protocol of the A1 interface. It is part of a TS-family covering the O-RAN WG2: A1 interface as identified below: “**General Aspects and Principles**”. “**Transport Protocol**”. “**Application Protocol**”. “**Type Definitions**”.

1.2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document.

- [1] O-RAN WG2: “A1 interface: General Aspects and Principles”
- [2] O-RAN WG2: “A1 interface: Application Protocol”
- [3] O-RAN WG2: “A1 interface: Type Definitions”
- [4] IETF RFC 793: “Transmission Control Protocol”.
- [5] IETF RFC 5246: “The Transport Layer Security (TLS) Protocol Version 1.2”
- [6] IETF RFC 8446: “The Transport Layer Security (TLS) Protocol Version 1.3”
- [7] IETF RFC 2818: “HTTP over TLS”
- [8] IETF RFC 7230: “Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing”
- [9] IETF RFC 7321: “Hypertext Transfer Protocol (HTTP/1.1): Semantics and Content”
- [10] IETF RFC 7540: “Hypertext Transfer Protocol Version 2 (HTTP/2)”
- [11] IETF RFC 8259: “The JavaScript Object Notation (JSON) Data Interchange Format.”
- [12] IETF RFC 8200 (2017-07): “Internet Protocol, Version 6 (IPv6) Specification”.
- [13] IETF RFC 791 (1981-09): “Internet Protocol”.

1.3 Definitions and Abbreviations

1.3.1 Definitions

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

A1: Interface between Non-RT RIC and Near-RT RIC

1.3.2 Abbreviations

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

RT Real Time

RIC RAN Intelligent Controller

Chapter 2 A1 Interface protocol stack

2.1 General

This document is part of a document family that specifies the O-RAN A1 interface. The other documents are A1 interface: Generic Aspects and Principles [1], A1 interface: Application Protocol [2], and A1 interface: Type Definitions [3].

2.2 Reference model

The A1 interface is defined between the Non-RT RIC and the Near-RT RIC functions. The A1 architecture and principles are described in A1 interface: General Aspects and Principles [1].

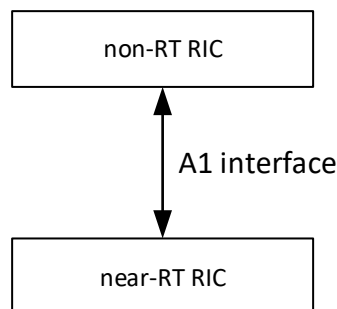


Figure 2.2-1: A1 interface reference model

2.3 Functions and protocol stack

The following layers of the protocol stack for A1 interface are described in the following chapters:

- TCP [4] provides the communication service at the transport layer;
- TLS [5][6] is used to provide secure HTTP [7][8] connections;
- HTTP [9][10] is used as application level protocol;
- The data interchange layer constitutes the transport of documents in the JSON format [11].

Figure 2.3-1 illustrates the protocol stack of the A1 interface.

Data Interchange	JSON
Application	HTTP
Security	TLS
Transport	TCP
Network	IP
Data link	Data link layer
Physical	Physical layer

Figure 2.3-1: A1 protocol stack

Chapter 3 Network layer

A1 may be transported over IPv6 (IETF RFC 8200 [12]) and/or IPv4 (IETF RFC 791 [13]).

Chapter 4 Transport layer

TCP (IETF RFC 793 [4]) shall be used as transport protocol.

NOTE: When using TCP as the transport protocol, an HTTP connection is mapped to a TCP connection.

Both Non-RT RIC and Near-RT RIC may act as HTTP client and HTTP server. As a result, Non-RT RIC and Near-RT RIC may establish a TCP connection for each direction. This permits bidirectional communication.

Chapter 5 Security

For the security protection at the transport layer, TLS v1.2 (IETF RFC 5246 [5]) shall be supported, and TLS v1.3 (IETF RFC 8446 [6]) should be supported.

Chapter 6 Application

As application layer, HTTP/1.1 (IETF RFC 7231 [9]) shall be supported, and HTTP/2 (IETF RFC 7540 [10]) should be supported.

HTTP over TLS (as defined in IETF RFC 2818 [7] and updated in IETF RFC 7230 [8]) shall be supported.

HTTP details such as standard headers, custom headers, error codes, methods, URIs etc are specified in A1 interface: Application Protocol [2].

The default TCP port numbers should be used for HTTP operation.

Chapter 7 Data interchange

As a data interchange format, JSON (IETF RFC 8259 [11]) shall be supported. The objects transported in HTTP messages, and the data types in JSON format, are specified in A1 interface: Type Definitions [3].

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