**3GPP TSG-CT WG4 Meeting #108-eC4-221xyz**

**E-Meeting, 17th – 25th February 2022 (was C4-221203)**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **29.500** | **CR** | **0317** | **rev** | **1** | **Current version:** | **17.5.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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|  | | | | | | | | | | |
| ***Title:*** | URL Encoding | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | CT4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | SBIProtoc17 | | | | |  | ***Date:*** | | | 2022-02-04 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | When sending generic data in URIs (e.g. in query parameters), certain "reserved" characters must be escaped (percent-encoded). This process is usually known as "URL Encoding".  The 5GC specification (29.500) do not contain any guidance about which characters must be escaped.  See Discussion Paper in C4-220198. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Add a new clause for URL Encoding, covering both the encoding of data in URIs (in query parameter values, and URI path segments) and also in request bodies using the "application/x-www-form-urlencoded" media type. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Potential interoperability issues between implementations. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 3.3.4, 5.1, 5.2.x (new) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | Notes for CR implementation:  - The change in 3.3.4 is editorial and simply divides clauses 3.3.4 and 4, which were incorrectly merged into one line  - The change in 5.1 corrects the title of Figure 5.1-1 since it contained an "expand/collapse" mark, which resulted into the entire clause 5 (all the sub-clauses) to be included inside this Figure title. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\* \* \* First Change \* \* \* \*

# 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 *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 22.261: "Service requirements for the 5G system; Stage 1".

[3] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[4] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[5] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

[6] IETF RFC 793: "Transmission Control Protocol".

[7] IETF RFC 7540: "Hypertext Transfer Protocol Version 2 (HTTP/2)".

[8] 3GPP TS 29.510: "5G System; Network Function Repository Services; Stage 3".

[9] OpenAPI: "OpenAPI Specification Version 3.0.0", <https://spec.openapis.org/oas/v3.0.0>.

[10] IETF RFC 8259: "The JavaScript Object Notation (JSON) Data Interchange Format".

[11] IETF RFC 7231: "Hypertext Transfer Protocol (HTTP/1.1): Semantics and Content".

[12] IETF RFC 7230: "Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing".

[13] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces Stage 3".

[14] IETF RFC 3986: "Uniform Resource Identifier (URI): Generic Syntax".

[15] 3GPP TS 23.003: "Numbering, addressing and identification".

[16] IETF RFC 5681: "TCP Congestion Control".

[17] 3GPP TS 33.501: "Security Architecture and Procedures for 5G System".

[18] IANA: "SMI Network Management Private Enterprise Codes", <http://www.iana.org/assignments/enterprise-numbers>.

[19] IETF RFC 7944: "Diameter Routing Message Priority".

[20] IETF RFC 7234: "Hypertext Transfer Protocol (HTTP/1.1): Caching".

[21] IETF RFC 7235: " Hypertext Transfer Protocol (HTTP/1.1): Authentication".

[22] IETF RFC 6749: "The OAuth 2.0 Authorization Framework".

[23] IETF RFC 6750: "The OAuth 2.0 Authorization Framework: Bearer Token Usage".

[24] IETF RFC 7232: "Hypertext Transfer Protocol (HTTP/1.1): Conditional Requests".

[25] IETF RFC 7516: "JSON Web Encryption (JWE)".

[26] IETF RFC 7515: "JSON Web Signature (JWS)".

[27] 3GPP TS 29.573: "5G System: Public Land Mobile Network (PLMN) Interconnection; Stage 3".

[28] 3GPP TS 29.502: "5G System; Session Management Services; Stage 3".

[29] 3GPP TS 29.503: "5G System; Unified Data Management Services; Stage 3".

[30] Void.

[31] 3GPP TS 29.518: "5G System; Access and Mobility Management Services; Stage 3".

[32] 3GPP TS 29.531: "5G System; Network Slice Selection Services; Stage 3".

[33] IETF RFC 7694: "Hypertext Transfer Protocol (HTTP) Client-Initiated Content-Encoding".

[34] IETF RFC 1952: "GZIP file format specification version 4.3".

[35] 3GPP TS 29.525: "5G System; UE Policy Control Service; Stage 3".

[36] IETF RFC 3040: "Internet Web Replication and Caching Taxonomy".

[37] IETF RFC 5322: "Internet Message Format".

[38] 3GPP TS 23.527: "5G System; Restoration Procedures".

[39] 3GPP TS 29.303: "Domain Name System Procedures; Stage 3".

[40] 3GPP TS 29.515: "5G System; GMLC Services; Stage 3".

[41] IETF RFC 7519: "JSON Web Token (JWT)".

[42] 3GPP TS 32.291: "5G System; charging service; Stage 3".

[43] IETF RFC 5234: "Augmented BNF for Syntax Specifications: ABNF".

[44] 3GPP TS 29.526: "5G System; Network Slice-Specific Authentication and Authorization (NSSAA) Services; Stage 3".

[45] 3GPP TS 29.562: " 5G System; Home Subscriber Server (HSS) Services for interworking with the IP Multimedia Subsystem (IMS); Stage 3".

[46] 3GPP TS 29.555: "5G System; 5G Direct Discovery Name Management Services; Stage 3".

[xx] IETF RFC 1866: "Hypertext Markup Language - 2.0".

[yy] IETF RFC 1738: "Uniform Resource Locators (URL)".

\* \* \* Next Change \* \* \* \*

### 3.3.4 SBI specific usage of delimiters

See clause 3.3.4 in 3GPP TS 29.501 [5].

# 4 Service Based Architecture Overview

\* \* \* Next Change \* \* \* \*

## 5.1 Protocol Stack Overview

The protocol stack for the service-based interfaces is shown on Figure 5.1-1.



Figure 5.1-1: SBI Protocol Stack

The service-based interfaces use HTTP/2 protocol (see clause 5.2) with JSON (see clause 5.4) as the application layer serialization protocol. For the security protection at the transport layer, all 3GPP NFs shall support TLS and TLS shall be used within a PLMN if network security is not provided by other means, as specified in 3GPP TS 33.501 [17].

\* \* \* Next Change \* \* \* \*

### 5.2.x URL Encoding of data

#### 5.2.x.1 General

As indicated in IETF RFC 3986 [14], the URI syntax defines a set of characters (a subset of the URI allowed characters) as delimiters of syntax components; those characters are called "reserved" and should not be used in URI fields intended to convey generic data (e.g., in the value part of a query parameter, or in the URI path segments), since this would interfere with the original meaning (syntax) of those reserved characters.

In addition, HTTP/2 request body parts encoded with media type "application/x-www-form-urlencoded" shall also escape reserved and unsafe characters, as described in OpenAPI Specification [9].

#### 5.2.x.2 URL Encoding of URI value parameters

When a URI is composed in the 3GPP 5G APIs, the different components (e.g., path segments, values of query parameters, etc.) shall percent-encode (see IETF RFC 3986 [14], section 2.1) the following "reserved" characters:

- EXCLAMATION MARK (U+0021): **!**

- NUMBER SIGN (U+0023): #

- DOLLAR SIGN (U+0024): $

- AMPERSAND (U+0026): &

- APOSTROPHE (U+0027): '

- LEFT PARENTHESIS (U+0028): **(**

- RIGHT PARENTHESIS (U+0029): **)**

- ASTERISK (U+002A): \*

- PLUS SIGN (U+002B): +

- COMMA (U+002C): **,**

- SOLIDUS (U+002F): **/**

- COLON (U+003A): **:**

- SEMICOLON (U+003B): **;**

- EQUALS SIGN (U+003D): **=**

- QUESTION MARK (U+003F): **?**

- COMMERCIAL AT (U+0040): **@**

- LEFT SQUARE BRACKET (U+005B): **[**

- RIGHT SQUARE BRACKET (U+005D): **]**

The following characters (not listed as "reserved" in IETF RFC 3986 [14]) shall be percent-encoded:

- QUOTATION MARK (U+0022): **"**

- PERCENT SIGN (U+0025): %

SPACE (U+0020) character shall be escaped, either by percent-encoding it (as %20), or by replacing it with character PLUS SIGN (U+002B).

The encoding of query parameters consisting of arrays of strings shall follow the guidelines indicated in 3GPP TS 29.501 [5], clause 5.13.13, for the escaping of the COMMA (U+002C) characters.

In addition, implementations may percent-encode other characters, such as:

- LEFT CURLY BRACKET (U+007B): **{**

- RIGHT CURLY BRACKET (U+007D): **}**

#### 5.2.x.3 URL Encoding of HTTP/2 request bodies

When composing an HTTP/2 request body with media type "application/x-www-form-urlencoded", the OpenAPI Specification [9] requires that the encoding shall follow IETF RFC 1866 [xx], section 8.2.1, which indicates:

a) the "reserved" character set described in IETF RFC 1738 [yy], section 2.2, shall be percent-encoded:

- AMPERSAND (U+0026): &

- SOLIDUS (U+002F): **/**

- COLON (U+003A): **:**

- SEMICOLON (U+003B): **;**

- EQUALS SIGN (U+003D): **=**

- QUESTION MARK (U+003F): **?**

- COMMERCIAL AT (U+0040): **@**

b) SPACE (U+0020) character shall be escaped by replacing it with character PLUS SIGN (U+002B).

The following characters (not listed as "reserved" in IETF RFC 1738 [yy]) shall be percent-encoded:

- QUOTATION MARK (U+0022): **"**

- PERCENT SIGN (U+0025): %

- COMMA (U+002C): **,**

- LEFT SQUARE BRACKET (U+005B): **[**

- RIGHT SQUARE BRACKET (U+005D): **]**

- LEFT CURLY BRACKET (U+007B): **{**

- RIGHT CURLY BRACKET (U+007D): **}**

In addition, implementations may also percent-encode any of the characters listed in clause 5.2.x.2.

\* \* \* End of Changes \* \* \* \*