**3GPP TSG-CT WG4 Meeting #110-eC4-223400**

**E-Meeting, 12th – 20th May 2022 C4-223199**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** |  | **rev** | **1** | **Current version:** |  |  |
|  | | | | | | | | |
| *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:*** | FQDN Pattern Matching Rule | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | C4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** |  | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***Release:*** | | |  |
|  | *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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | CT3 and CT4 are including either arrays of FQDNs or FQDN regular expressions in their APIs in order to provide the receiver Network Function the list of FQDN(s) against which a matching is required.  The use of arrays of FQDNs requires that the Network Function needs to provide each specific FQDN.  This can be avoided with the use of regular expressions.  However, this is considered an overkilled solution that, although regular expression is versatile and flexible, it may have a big impact in performance for UPF/EASDF and may cause faulty situations.  Especially when a DNS Context or a PFCP session include multiple DNS matching template or PDRs using regular expression to match, it is possible that multiple templates or multiple PDRs get matched, **which leads completely different results than originally intended,** e.g. forward the DNS message to a wrong DNS server.  These DNS Matching Templates in the DNS rule or Packet Detection Information in the PDRs are generated upon the request from DIFFERENT AFs, it would be heavy task or even impossible for SMF or PCF to validate and ensure there is no overlapping DNS template or PDRs when regular expression are used, the same for UPF/EASDF. There is a huge risk that an unexpected PDR or DNS template is matched and leads complete wrong result.  This CR proposes to use a data type structure, FqdnPatternMatchingRule, where a FQDN pattern is either described by a stringMatchingRule or a regex (Regular Expression), where the StringMatchingRule shall be used preferrably whenever possible to optimize the matching process and reduce processing load, e.g. in the UPF or EASDF. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Propose a new data type ""FqdnPatternMatchingRule" to match a FQDN pattern. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Misaligned specifications and suboptimal system design, high risk to lead error situation, e.g. forward a DNS request to a wrong DNS server. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 5.2.4.a, 5.2.4.x, 5.2.4.y, 5.2.3.x, A.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | | This CR is a backwards compatible feature in the OpenAPI file of the CommonData API. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | Rev1: Introducing FqdnPatternMatchingRule which is either described by a regular expression or by a StringMatchingRule. The StringMatchingRule shall be used whever possible. | | | | | | | | |

\* \* \* \* 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 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

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

[4] IETF RFC 1166: "Internet Numbers".

[5] IETF RFC 5952: "A recommendation for IPv6 address text representation".

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

[7] 3GPP TS 23.003: "Numbering, addressing and identification".

[8] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[9] IETF RFC 7807: "Problem Details for HTTP APIs".

[10] IETF RFC 3339: "Date and Time on the Internet: Timestamps".

[11] 3GPP TS 38.413: "NG-RAN; NG Application Protocol (NGAP) ".

[12] IETF RFC 6901: "JavaScript Object Notation (JSON) Pointer".

[13] 3GPP TS 24.007: "Mobile radio interface signalling layer 3; General aspects".

[14] IETF RFC 6902: "JavaScript Object Notation (JSON) Patch".

[15] IETF RFC 4122: "A Universally Unique IDentifier (UUID) URN Namespace".

[16] 3GPP TS 36.413: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 Application Protocol (S1AP)".

[17] IETF RFC 7042: "IANA Considerations and IETF Protocol and Documentation Usage for IEEE 802 Parameters".

[18] IETF RFC 6733: "Diameter Base Protocol".

[19] 3GPP TS 32.422: "Telecommunication management; Subscriber and equipment trace; Trace control and configuration management".

[20] 3GPP TS 24.501: "Non-Access-Stratum (NAS) Protocol for 5G System (5GS); Stage 3".

[21] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".

[22] Void.

[23] 3GPP TS 23.032: "Universal Geographical Area Description (GAD)".

[24] ITU-T Recommendation Q.763 (1999): "Specifications of Signalling System No.7; Formats and codes".

[25] 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".

[26] 3GPP TS 23.015: "Technical Realization of Operator Determined Barring".

[27] 3GPP TR 21.900: "Technical Specification Group working methods".

[28] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[29] 3GPP TS 29.510: "5G System; Network Function Repository Services; Stage 3".

[30] 3GPP TS 23.316: "Wireless and wireline convergence access support for the 5G System (5GS)".

[31] IEEE Std 802.11-2012: "IEEE Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications".

[32] CableLabs WR-TR-5WWC-ARCH: "5G Wireless Wireline Converged Core Architecture".

[33] 3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access; Stage 2".

[34] BBF TR-069: "CPE WAN Management Protocol".

[35] BBF TR-369: "User Services Platform (USP)".

[36] 3GPP TS 23.287: "Architecture enhancements for 5G System (5GS) to support Vehicle-to-Everything (V2X) services".

[37] BBF TR-470: "5G Wireless Wireline Convergence Architecture".

[38] IEEE "Guidelines for Use of Extended Unique Identifier (EUI), Organizationally Unique Identifier (OUI), and Company ID (CID)", <https://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/tutorials/eui.pdf>

[39] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification".

[40] IETF RFC 5580: "Carrying Location Objects in RADIUS and Diameter".

[41] BBF TR-456: "AGF Functional Requirements".

[42] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".

[43] 3GPP TS 29.572: "5G System; Location Management Services; Stage 3".

[x] ECMA-262: "ECMAScript® Language Specification", <https://www.ecma-international.org/ecma-262/5.1/>.

\* \* \* \* Next change \* \* \* \*

##### 5.2.4.a Type: FqdnPatternMatchingRule

Table 5.2.4.a-1: Definition of type FqdnPatternMatchingRule

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description |
| regex | string | C | 0..1 | One FQDN pattern, defined as a regular expression according to the ECMA-262 dialect [x].  (NOTE) |
| stringMatchingRule | StringMatchingRule | C | 0..1 | One FQDN pattern, described as a string match rule.  (NOTE) |
| NOTE: When provisioning an FQDN pattern, the StringMatchingRule shall be preferred over regular expression and used whenever possible (i.e. if the pattern can be described by a string matching rule) to optimize the matching process and reduce the processing load, since the use of regular expressions can be more computing intensive than using string matching rule. Either the regex or the stringMatchingRule shall be present. | | | | |

EXAMPLE 1: A FQDN pattern described by a string matching rule matching all FQDNs with "smartmeter-{factoryID}.company.com" where "*{factoryID}*" can be any string   
JSON: {"stringMatchingRule": {stringMatchingConditions:[{"matchingString": "smartmeter-","matchingOperator": "STARTS\_WITH"},{"matchingString": ".company.com","matchingOperator": "ENDS\_WITH"}]}}

EXAMPLE 2: A FQDN pattern described by a regular expression matching all FQDNs with "smartmeter-{factoryID}.company.com" where "*{factoryID}*" can be any string.  
JSON: {"regex": "^smartmeter-.+\.company\.com$"}

\* \* \* \* Next change \* \* \* \*

##### 5.2.4.x Type: StringMatchingRule

Table 5.2.4.x-1: Definition of type StringMatchingRule

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description |
| stringMatchingConditions | array(StringMatchingCondition) | M | 1..N | Contains a list of conditions which shall be evaluated for string matching. |
| NOTE: The conditions in the stringMatchingConditions array shall be evaluated as "and" logical relationship. | | | | |

\* \* \* \* Next change \* \* \* \*

##### 5.2.4.y Type: StringMatchingCondition

Table 5.2.4.y-1: Definition of type StringMatchingCondition

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description |
| matchingString | string | C | 0..1 | This IE shall be present to identify the string against which the matching is performed except when the matchingOperator is MATCH\_ALL. |
| matchingOperator | MatchingOperator | M | 1 | Identifies the matching operation. |

\* \* \* \* Next change \* \* \* \*

##### 5.2.3.x Enumeration: MatchingOperator

Table 5.2.3.x-1: Enumeration MatchingOperator

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| FULL\_MATCH | Indicates a full match between the string against which the matching applies and the provided matching string. |  |
| MATCH\_ALL | Indicate a match for any string |  |
| STARTS\_WITH | Indicates a match when the string against which the matching applies starts with the provided matching string (e.g. the string "smartmeter-01.company.com” matches the matching string "smartmeter-"). |  |
| NOT\_START\_WITH | Indicates a match when the string against which the matching applies does not start with the provided matching string (e.g. the string "smartmeter-01.company.com” matches the matching string “metersmart-"). |  |
| ENDS\_WITH | Indicates a match when the string against which the matching applies ends with the matching string (e.g. the string "somehost.company.com" matches the matching string "company.com"). |  |
| NOT\_END\_WITH | Indicates a match when the string against which the matching applies does not end with the matching string (e.g. the string "somehost.company.com" matches the matching string "company.se"). |  |
| CONTAINS | Indicates a match when the string against which the matching applies contains the matching string (e.g. the string "media.news.com" matches the matching string "media"). |  |
| NOT\_CONTAIN | Indicates a match when the string against which the matching applies does not contain the matching string (e.g. the string "media.news.com" matches the matching string "aidem"). |  |

\* \* \* \* Next change \* \* \* \*

## A.2 Data related to Common Data Types

openapi: 3.0.0

info:

version: '1.3.0-alpha.5'

title: 'Common Data Types'

description: |

Common Data Types for Service Based Interfaces.

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externalDocs:

description: 3GPP TS 29.571 Common Data Types for Service Based Interfaces, version 17.5.0

url: 'https://www.3gpp.org/ftp/Specs/archive/29\_series/29.571/'

**...Skipped for clarity...**

NullValue:

enum:

- null

description: JSON's null value.

MatchingOperator:

anyOf:

- type: string

enum:

- FULL\_MATCH

- MATCH\_ALL

- STARTS\_WITH

- NOT\_START\_WITH

- ENDS\_WITH

- NOT\_END\_WITH

- CONTAINS

- NOT\_CONTAIN

- type: string

description: the matching operation.

**...Skipped for clarity...**

TunnelAddress:

description: Tunnel address

type: object

properties:

ipv4Addr:

$ref: '#/components/schemas/Ipv4Addr'

ipv6Addr:

$ref: '#/components/schemas/Ipv6Addr'

portNumber:

$ref: '#/components/schemas/Uinteger'

required:

- portNumber

anyOf:

- required: [ ipv4Addr ]

- required: [ ipv6Addr ]

FqdnPatternMatchingRule:

description: a matching rule for a FQDN pattern

type: object

oneOf:

- required: [ regex ]

- required: [ stringMatchingRule ]

properties:

regex:

type: string

stringMatchingRule:

$ref: '#/components/schemas/StringMatchingRule'

StringMatchingRule:

description: A list of conditions for string matching

type: object

properties:

stringMatchingConditions:

type: array

items:

$ref: '#/components/schemas/StringMatchingCondition'

minItems: 1

StringMatchingCondition:

description: A String with Matching Operator

type: object

properties:

matchingString:

type: string

matchingOperator:

$ref: '#/components/schemas/MatchingOperator'

required:

- matchingOperator

\* \* \* \* End of changes \* \* \* \*