**3GPP TSG-CT WG1 Meeting #124-eC1-** **203533**

**Electronic meeting, 2-10 June 2020**

|  |
| --- |
| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **24.008** | **CR** | **3226** | **rev** | **-** | **Current version:** | **16.4.0** |  |
|  |
| *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 | **X** | Radio Access Network |  | Core Network | **X** |

|  |
| --- |
|  |
| ***Title:***  | Provisioning of DNS server security information to the UE-24.008 |
|  |  |
| ***Source to WG:*** | Samsung |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** | 5GProtoc16 |  | ***Date:*** | 2020-05-24 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-16 |
|  | *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 canbe 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-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
|  |  |
| ***Reason for change:*** | This CR implements the highlighted requirement captured in SA3 CR .*X.2 Security aspects of DNS**It is recommended that the UE and DNS server(s) support DNS over (D)TLS as specified in RFC 7858 [xx] and RFC 8310 [yy]. The DNS server(s) that are deployed within the 3GPP network can enforce the use of DNS over (D)TLS. The UE can be pre-configured with the DNS server security information (out-of-band configurations specified in the IETF RFCs like, credentials to authenticate the DNS server, supported security mechanisms, port number, etc.), or the core network can configure the DNS server security information to the UE.* |
|  |  |
| ***Summary of change:*** | Define a protocol container in ePCO to transfer the DNS server security information. |
|  |  |
| ***Consequences if not approved:*** | SA3 requirement will not be fullfiled. |
|  |  |
| ***Clauses affected:*** | 10.5.6.3.1 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 24.301CR 3404, TS 24.501 CR 2345 |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ... |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***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] Void.

[2] Void.

[2a] 3GPP TR 21.905 "Vocabulary for 3GPP Specifications"

[3] 3GPP TS 22.002: "Circuit Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)".

[4] 3GPP TS 22.003: "Teleservices supported by a Public Land Mobile Network (PLMN)".

[5] 3GPP TS 42.009, Release 4: "Security aspects".

[5a] 3GPP TS 33.102: "3G security; Security architecture".

[6] Void.

[7] 3GPP TS 42.017, Release 4: "Subscriber Identity Modules (SIM); Functional characteristics".

[8] 3GPP TS 22.101: "Service aspects; Service principles".

[8a] 3GPP TS 22.001: "Principles of circuit telecommunication services supported by a Public Land Mobile Network (PLMN)".

[8b] 3GPP TS 23.038: "Alphabets and language-specific information".

[9] Void.

[9a] 3GPP TS 23.108: "Mobile radio interface layer 3 specification core network protocols; Stage 2 (structured procedures)".

[10] 3GPP TS 23.003: "Numbering, addressing and identification".

[11] Void.

[12] 3GPP TS 23.014: "Support of Dual Tone Multi-Frequency (DTMF) signalling".

[12a] ETSI ES 201 235-2, v1.2.1: "Specification of Dual Tone Multi-Frequency (DTMF); Transmitters and Receivers; Part 2: Transmitters".

[13] 3GPP TS 43.020: "Security-related network functions".

[14] 3GPP TS 23.122: "Non-Access-Stratum functions related to Mobile Station (MS) in idle mode".

[15] 3GPP TS 24.002: "GSM-UMTS Public Land Mobile Network (PLMN) access reference configuration".

[16] 3GPP TS 44.003: "Mobile Station - Base Station System (MS - BSS) interface; Channel structures and access capabilities".

[17] Void.

[18] 3GPP TS 44.005: "Data Link (DL) layer; General aspects".

[19] 3GPP TS 44.006: "Mobile Station - Base Station System (MS - BSS) interface; Data Link (DL) layer specification".

[19a] 3GPP TS 25.321: "Medium Access Control (MAC) protocol specification".

[19b] 3GPP TS 25.322: "Radio Link Control (RLC) protocol specification".

[19c] 3GPP TS 25.413: "UTRAN Iu interface Radio Access Network Application Part (RANAP) signalling".

[20] 3GPP TS 24.007: "Mobile radio interface signalling layer 3; General aspects".

[21] 3GPP TS 24.010: "Mobile radio interface layer 3; Supplementary services specification; General aspects".

[22] 3GPP TS 24.011: "Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface".

[23] 3GPP TS 24.012: "Short Message Service Cell Broadcast (SMSCB) support on the mobile radio interface".

[23a] 3GPP TS 44.071: "Location Services (LCS); Mobile radio interface layer 3 specification."

[23b] 3GPP TS 44.031 "Location Services LCS); Mobile Station (MS) - Serving Mobile Location Centre (SMLC); Radio Resource LCS Protocol (RRLP)".

[23c] 3GPP TS 25.331: "Radio Resource Control (RRC) protocol specification"

[24] 3GPP TS 24.080: "Mobile radio Layer 3 supplementary service specification; Formats and coding".

[25] 3GPP TS 24.081: "Line identification supplementary services; Stage 3".

[26] Void.

[27] 3GPP TS 24.083: "Call Waiting (CW) and Call Hold (HOLD) supplementary services; Stage 3".

[28] 3GPP TS 24.084: "MultiParty (MPTY) supplementary services; Stage 3".

[29] Void.

[30] Void.

[31] Void.

[32] 3GPP TS 45.002: "Multiplexing and multiple access on the radio path".

[33] 3GPP TS 45.005: "Radio transmission and reception".

[34] 3GPP TS 45.008: "Radio subsystem link control".

[35] Void.

[36] 3GPP TS 27.001: "General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[36a] 3GPP TS 27.060: "Mobile Station (MS) supporting Packet Switched Services ".

[37] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".

[38] 3GPP TS 29.007: "General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".

[39] 3GPP TS 51.010: "Mobile Station (MS) conformance specification".

[40] Void.

[41] ISO/IEC 646 (1991): "Information technology - ISO 7-bit coded character set for information interchange".

[42] ISO/IEC 6429: "Information technology - Control functions for coded character sets".

[43] ISO 8348 (1987): "Information technology -- Open Systems Interconnection -- Network Service Definition".

[44] ITU-T Recommendation E.163: "Numbering plan for the international telephone service".

[45] ITU-T Recommendation E.164: "The international public telecommunication numbering plan".

[46] ITU-T Recommendation E.212: "The international identification plan for mobile terminals and mobile users".

[47] ITU-T Recommendation F.69 (1993): "The international telex service - Service and operational provisions of telex destination codes and telex network identification codes".

[48] ITU-T Recommendation I.330: "ISDN numbering and addressing principles".

[49] ITU-T Recommendation Q.920 (1993): "ISDN user-network interface data link layer - General aspects".

[50] ITU-T Recommendation Q.930 (1993): "ISDN user-network interface layer 3 - General aspects".

[51] ITU-T Recommendation I.500 (1993): "General structure of the ISDN interworking recommendations".

[52] ITU-T Recommendation T.50: "International Reference Alphabet (IRA) (Formerly International Alphabet No. 5 or IA5) - Information technology - 7-bit coded character set for information interchange".

[53] ITU Recommendation Q.931: "ISDN user-network interface layer 3 specification for basic control".

[54] ITU-T Recommendation V.21: "300 bits per second duplex modem standardized for use in the general switched telephone network".

[55] ITU-T Recommendation V.22: "1200 bits per second duplex modem standardized for use in the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".

[56] ITU-T Recommendation V.22bis: "2400 bits per second duplex modem using the frequency division technique standardized for use on the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".

[57] Void.

[58] ITU-T Recommendation V.26ter: "2400 bits per second duplex modem using the echo cancellation technique standardized for use on the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".

[59] ITU-T Recommendation V.32: "A family of 2-wire, duplex modems operating at data signalling rates of up to 9600 bit/s for use on the general switched telephone network and on leased telephone-type circuits".

[60] ITU-T Recommendation V.110: "Support by an ISDN of data terminal equipments with V-Series type interfaces".

[61] ITU-T Recommendation V.120: "Support by an ISDN of data terminal equipment with V-Series type interfaces with provision for statistical multiplexing".

[62] ITU-T Recommendation X.21: "Interface between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for synchronous operation on public data networks".

[63] Void.

[64] Void.

[65] ITU-T Recommendation X.30: "Support of X.21, X.21 bis and X.20 bis based Data Terminal Equipments (DTEs) by an Integrated Services Digital Network (ISDN)".

[66] ITU-T Recommendation X.31: "Support of packet mode terminal equipment by an ISDN".

[67] Void.

[68] Void.

[69] ITU-T Recommendation X.121: "International numbering plan for public data networks".

[70] ETSI ETS 300 102-1: "Integrated Services Digital Network (ISDN); User-network interface layer 3; Specifications for basic call control".

[71] Void.

[72] ISO/IEC 10646: "Information technology -- Universal Multiple-Octet Coded Character Set (UCS)".

[73] 3GPP TS 22.060: "General Packet Radio Service (GPRS); Service Description; Stage 1".

[74] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service Description; Stage 2".

[75] Void.

[75a] 3GPP TS 43.318: "Generic Access Network (GAN); Stage 2".

[76] 3GPP TS 44.060: "General Packet Radio Service (GPRS); Mobile Station (MS) - Base Station System (BSS) interface; Radio Link Control/Medium Access Control (RLC/MAC) protocol".

[76b] 3GPP TS 44.318: "Generic Access Network (GAN); Mobile GAN interface layer 3 specification; Stage 3".

[77] Void.

[78] 3GPP TS 44.065: "Mobile Station (MS) - Serving GPRS Support Node (SGSN); Subnetwork Dependent Convergence Protocol (SNDCP)".

[78a] 3GPP TS 44.064: "Mobile Station - Serving GPRS Support Node (MS-SGSN) Logical Link Control (LLC) Layer Specification".

[79] ITU Recommendation I.460: "Multiplexing, rate adaption and support of existing interfaces".

[80] 3GPP TS 26.111: "Codec for Circuit Switched Multimedia Telephony Service; Modifications to H.324".

[81] 3GPP TS 23.107: "Quality of Service (QoS) concept and architecture".

[82] 3GPP TS 43.022: "Functions related to Mobile Station (MS) in idle mode and group receive mode".

[83] 3GPP TS 26.103: "Speech Codec List for GSM and UMTS".

[84] 3GPP TS 44.018: "Mobile radio interface layer 3 specification, Radio Resource Control Protocol".

[85] 3GPP TS 48.008: "Mobile-services Switching Centre – Base Station System (MSC – BSS) interface; layer 3 specification".

[86] 3GPP TS 48.018: "General Packet Radio Service (GPRS); Base Station System (BSS) - Serving GPRS Support Node (SGSN); BSS GPRS Protocol (BSSGP)".

[87] 3GPP TS 43.055: "Dual Transfer Mode (DTM); Stage 2".

[88] 3GPP TS 23.067: "enhanced Multi-Level Precedence and Pre-emption service (eMLPP); Stage 2".

[88a] 3GPP TS 23.093: "Technical realization of Completion of Calls to Busy Subscriber (CCBS); Stage 2".

[89] 3GPP TS 22.042: "Network Identity and Time Zone (NITZ), Stage 1".

[90] 3GPP TS 23.040: "Technical realization of Short Message Service (SMS)".

[91] 3GPP TS 44.056: "GSM Cordless Telephony System (CTS), (Phase 1) CTS Radio Interface Layer 3 Specification".

[92] 3GPP TS 23.226: "Global Text Telephony; Stage 2"

[93] 3GPP TS 26.226: "Cellular Text Telephone Modem (CTM), General Description"

[94] 3GPP TS 23.236: "Intra Domain Connection of RAN Nodes to Multiple CN Nodes"

[95] 3GPP TS 24.229: "IP Multimedia Call Control Protocol based on SIP and SDP"

[96] 3GPP TS 23.205: "Bearer-independent circuit-switched core network; Stage 2".

[97] 3GPP TS 23.172: "UDI/RDI Fallback and Service Modification; Stage 2".

[98] 3GPP TS 25.304: "UE Procedures in Idle Mode and Procedures for Cell Reselection in Connected Mode"

[99] IETF RFC 4291 (February 2006): "Internet Protocol Version 6 (IPv6) Addressing Architecture".

[100] 3GPP TS 29.207, Release 6: "Policy control over Go interface".

[101] 3GPP TS 21.111: "USIM and IC card requirements".

[102] IETF RFC 1661 (July 1994): "The Point-to-Point Protocol (PPP)".

[103] IETF RFC 3232 (January 2002): "Assigned Numbers: RFC 1700 is Replaced by an On-line Database".

[104] 3GPP TS 23.034: "High Speed Circuit Switched Data (HSCSD) – Stage 2".

[105] 3GPP TS 23.271: "Functional stage 2 description of Location Services (LCS)".

[106] 3GPP TS 23.246: "Multimedia Broadcast/Multicast Service (MBMS); Architecture and Functional Description".

[107] IETF RFC 3376 (October 2002): "Internet Group Management Protocol, Version 3".

[108] IETF RFC 2710 (October 1999): "Multicast Listener Discovery (MLD) for IPv6".

[109] 3GPP TS 23.251: "Network Sharing; Architecture and Functional Description".

[110] 3GPP TS 25.346: "Introduction of the Multimedia Broadcast Multicast Service (MBMS) in the Radio Access Network"

[111] 3GPP TS 44.118, Release 11: "Radio Resource Control (RRC) protocol; Iu mode".

[112] 3GPP TS 31.102: "Characteristics of the USIM Application".

[113] 3GPP TS 43.129: "Packet-switched handover for GERAN A/Gb mode; Stage 2".

[114] 3GPP TS 23.009: "Handover procedures".

[115] 3GPP TR 23.903: "Redial solution for voice-video switching".

[116] 3GPP TS 24.279: "Combining Circuit Switched (CS) and IP Multimedia Subsystem (IMS) services, stage 3"

[117] ITU-T Recommendation H.324 Amendment 1: "New Annex K "Media Oriented Negotiation Acceleration Procedure" and associated changes to Annex".

[118] ITU-T Recommendation H.324 Amendment 2: "New Annex L on text conversation and associated changes; corrections and clarifications to Annex K".

[119] ITU-T Recommendation H.245: "Control protocol for multimedia communication"

[120] 3GPP TS 24.301: "Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3".

[121] 3GPP TS 36.304: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) procedures in idle mode".

[122] 3GPP TS 23.401: "GPRS enhancements for E-UTRAN access".

[123] 3GPP TS 33.401: "3GPP System Architecture Evolution; Security architecture".

[124] 3GPP TS 24.303: "Mobility management based on Dual-Stack Mobile IPv6; Stage 3".

[125] 3GPP TS 24.327: "Mobility between 3GPP WLAN Interworking and 3GPP systems; GPRS and 3GPP I-WLAN aspects; Stage 3".

[126] 3GPP TS 23.216: "Single Radio Voice Call Continuity (SRVCC); Stage 2".

[127] 3GPP TS 23.002: "Network architecture".

[128] 3GPP TS 25.301: "Radio interface protocol architecture".

[129] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification".

[130] 3GPP TS 29.061: "Interworking between the Public Land Mobile Network (PLMN) supporting packet based services and Packet Data Networks (PDN)".

[131] 3GPP TS 23.221: "Architectural requirements".

[132] 3GPP TS 23.090: "Unstructured Supplementary Service Data (USSD); Stage 2".

[133] 3GPP TS 23.272: "Circuit Switched Fallback in Evolved Packet System; Stage 2".

[133A] 3GPP TS 23.682: "Architecture enhancements to facilitate communications with packet data networks and applications".

[134] 3GPP TS 24.167: "3GPP IMS Management Object (MO); Stage 3".

[135] 3GPP TS 24.368: "Non-Access Stratum (NAS) configuration Management Object (MO)".

[136] 3GPP TS 24.237: "IP Multimedia Subsystem (IMS) Service Continuity; Stage 3".

[137] IETF RFC 3261 (June 2002): "SIP: Session Initiation Protocol".

[138] 3GPP TS 22.011: "Service accessibility".

[139] IETF RFC 3633 (December 2003): "IPv6 Prefix Options for Dynamic Host Configuration Protocol (DHCP) version 6".

[140] 3GPP TS 23.012: "Location management procedures".

[141] 3GPP TS 24.022: "Radio Link Protocol (RLP) for circuit switched bearer and teleservices".

[142] ITU-T Recommendation X.1: "International user classes of service in, and categories of access to, public data networks and Integrated Services Digital Networks (ISDNs)".

[143] ITU-T Recommendation X.25: "Interface between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit".

[144] ITU-T Recommendation X.213: "Information technology – Open Systems Interconnection – Network service definition".

[145] ITU-T Recommendation I.334: "Principles relating ISDN numbers/sub-addresses to the OSI reference model network layer addresses".

[146] ITU-T Recommendation H.223: "Multiplexing protocol for low bit rate multimedia communication".

[147] ITU-T Recommendation V.34: "A modem operating at data signalling rates of up to 33 600 bit/s for use on the general switched telephone network and on leased point-to-point 2-wire telephone-type circuits".

[148] IETF RFC 3810 (June 2004): "Multicast Listener Discovery Version 2 (MLDv2) for IPv6".

[149] 3GPP TS 29.018: "General Packet Radio Service (GPRS); Serving GPRS Support Node (SGSN) - Visitors Location Register (VLR); Gs interface layer 3 specification".

[150] 3GPP TS 29.272: "Evolved Packet System (EPS); Mobility Management Entity (MME) and Serving GPRS Support Node (SGSN) related interfaces based on Diameter protocol".

[151] 3GPP TS 45.008: "Radio subsystem link control".

[152] 3GPP TS 29.010: "Information element mapping between Mobile Station - Base Station System (MS - BSS) and Base Station System - Mobile-services Switching Centre (BSS - MSC); Signalling Procedures and the Mobile Application Part (MAP)".

[153] 3GPP TS 36.306: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio access capabilities".

[154] 3GPP TS 24.105: "Application specific Congestion control for Data Communication (ACDC) Management Object (MO)".

[155] 3GPP TS 23.161: "Network-Based IP Flow Mobility (NBIFOM); Stage 2".

[156] 3GPP TS 24.302: "Access to the 3GPP Evolved Packet Core (EPC) via non-3GPP access networks; Stage 3".

[157] 3GPP TS 45.001: "Physical layer on the radio path; General description".

[158] 3GPP TS 24.161: " Network-Based IP Flow Mobility (NBIFOM); Stage 3".

[159] 3GPP TS 43.064: "Overall description of the GPRS Radio Interface; Stage 2".

[160] 3GPP TS 23.167: "IP Multimedia Subsystem (IMS) emergency sessions".

[161] 3GPP TS 26.267: "eCall Data Transfer; In-band modem solution; General description".

[162] 3GPP TS 24.250: "Protocol for Reliable Data Service; Stage 3".

[163] 3GPP TS 24.292: "IP Multimedia (IM) Core Network (CN) subsystem; Centralized Services (ICS); Stage 3".

[164] 3GPP TS 29.292: "Interworking between the IP Multimedia (IM) Core Network (CN) Subsystem (IMS) and MSC Server for IMS Centralized Services (ICS)".

[165] 3GPP TS 49.031: "Location Services (LCS); Base Station System Application Part LCS Extension (BSSAP-LE)".

[166] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[167] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".

[168] IETF RFC 3629 (November 2003): "UTF-8, a transformation format of ISO 10646".

[169] IETF RFC 5905 (June 2010): "Network Time Protocol Version 4: Protocol and Algorithms Specification".

[170] 3GPP TS 33.501: "Security architecture and procedures for 5G System".

[171] 3GPP TS 24.193: "Access Traffic Steering, Switching and Splitting; Stage 3".

[172] IETF RFC 7858 (May 2016): "Specification for DNS over Transport Layer Security (TLS)".

[173] IETF RFC 8094 (February 2017): "DNS over Datagram Transport Layer Security (DTLS)".

[174] IET RFC 6056 (January 2011): "Recommendations for Transport-Protocol Port Randomization".

[175] IETF RFC 1035 (November 1987):"DOMAIN NAMES - IMPLEMENTATION AND SPECIFICATION".

[176] IETF RFC 7469 (April 2015):"Public Key Pinning Extension for HTTP".

[177] IETF RFC 6125(March 2011): "Representation and Verification of Domain-Based Application Service Identity within Internet Public Key Infrastructure Using X.509 (PKIX) Certificates in the Context of Transport Layer Security (TLS)".

[178] IETF RFC 7250 (June 2014): "Using Raw Public Keys in Transport Layer Security (TLS) and Datagram Transport Layer Security (DTLS) ".[179] [X.690] ITU-T Recommendation X.690 (2002) | ISO/IEC 8825-1:2002,
Information technology - ASN.1 encoding rules:
Specification of Basic Encoding Rules (BER), Canonical
Encoding Rules (CER) and Distinguished Encoding Rules
(DER).]

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*second change \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

#### 10.5.6.3 Protocol configuration options

##### 10.5.6.3.1 General

The purpose of the *protocol configuration options* information element is to:

- transfer external network protocol options associated with a PDP context activation, and

- transfer additional (protocol) data (e.g. configuration parameters, error codes or messages/events) associated with an external protocol or an application.

The *protocol configuration options* is a type 4 information element with a minimum length of 3 octets and a maximum length of 253 octets.

The *protocol configuration options* information element is coded as shown in figure 10.5.136/3GPP TS 24.008 and table 10.5.154/3GPP TS 24.008.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Protocol configuration options IEI | octet 1 |
| Length of protocol config. options contents | octet 2 |
| 1ext | 0 0 0 0Spare | Configurationprotocol | octet 3 |
| Protocol ID 1 | octet 4octet 5 |
| Length of protocol ID 1 contents | octet 6 |
| Protocol ID 1 contents | octet 7octet m |
| Protocol ID 2 | octet m+1octet m+2 |
| Length of protocol ID 2 contents | octet m+3 |
| Protocol ID 2 contents | octet m+4octet n |
| . . . | octet n+1octet u |
| Protocol ID n-1 | octet u+1octet u+2 |
| Length of protocol ID n-1 contents | octet u+3 |
| Protocol ID n-1 contents | octet u+4octet v |
| Protocol ID n | octet v+1octet v+2 |
| Length of protocol ID n contents | octet v+3 |
| Protocol ID n contents | octet v+4octet w |
| Container ID 1 | octet w+1octet w+2 |
| Length of container ID 1 contents | octet w+3 |
| Container ID 1 contents | octet w+4octet x |
| . . . | octet x+1octet y |
| Container ID n | octet y+1octet y+2 |
| Length of container ID n contents | octet y+3 |
| Container ID n contents | octet y+4octet z |
| Container ID n+1 | octet z+1octet z+2 |
| Length of container ID n+1 contents (see NOTE) | octet z+3octet z+4 |
| Container ID n+1 contents | octet z+5octet za |
| NOTE: If the container ID is 0023H, 0024H or 0030H for network to MS direction, then the octet z+3 and octet z+4 indicate the length of container ID contents. |

Figure 10.5.136/3GPP TS 24.008: *Protocol configuration options* information element

Table 10.5.154/3GPP TS 24.008: *Protocol configuration options* information element

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| **Configuration protocol** (octet 3)Bits3 2 10 0 0 PPP for use with IP PDP type or IP PDN type (see 3GPP TS 24.301 [120])All other values are interpreted as PPP in this version of the protocol.After octet 3, i.e. from octet 4 to octet z, two logical lists are defined:- the Configuration protocol options list (octets 4 to w), and- the Additional parameters list (octets w+1 to z).**Configuration protocol options list** (octets 4 to w)The *configuration protocol options list* contains a variable number of logical units, they may occur in an arbitrary order within the *configuration protocol options list*.Each unit is of variable length and consists of a:- protocol identifier (2 octets);- the length of the protocol identifier contents of the unit (1 octet); and- the protocol identifier contents itself (n octets).The *protocol identifier* field contains the hexadecimal coding of the configuration protocol identifier. Bit 8 of the first octet of the *protocol identifier* field contains the most significant bit and bit 1 of the second octet of the *protocol identifier* field contains the least significant bit.If the *configuration protocol options list* contains a protocol identifier that is not supported by the receiving entity the corresponding unit shall be ignored.The *length of the protocol identifier contents* field contains the binary coded representation of the length of the *protocol identifier contents* field of a unit. The first bit in transmission order is the most significant bit.The *protocol identifier contents* field of each unit contains information specific to the configuration protocol specified by the *protocol identifier.*At least the following protocol identifiers (as defined in RFC 3232 [103]) shall be supported in this version of the protocol:- C021H (LCP);- C023H (PAP);- C223H (CHAP); and- 8021H (IPCP).The support of other protocol identifiers is implementation dependent and outside the scope of the present document.The *protocol identifier contents* field of each unit corresponds to a “Packet” as defined in RFC 1661 [102] that is stripped off the “Protocol” and the “Padding” octets.The detailed coding of the *protocol identifier contents* field is specified in the RFC that is associated with the protocol identifier of that unit.**Additional parameters list** (octets w+1 to z)The *additional parameters list* is included when special parameters and/or requests (associated with a PDP context) need to be transferred between the MS and the network. These parameters and/or requests are not related to a specific configuration protocol (e.g. PPP), and therefore are not encoded as the "Packets" contained in the *configuration protocol options list*.The *additional parameters list* contains a list of special parameters, each one in a separate container. The type of the parameter carried in a container is identified by a specific *container identifier*. In this version of the protocol, the following container identifiers are specified:MS to network direction:- 0001H (P-CSCF IPv6 Address Request);- 0002H (IM CN Subsystem Signaling Flag);- 0003H (DNS Server IPv6 Address Request); - 0004H (Not Supported);- 0005H (MS Support of Network Requested Bearer Control indicator);- 0006H (Reserved);- 0007H (DSMIPv6 Home Agent Address Request);- 0008H (DSMIPv6 Home Network Prefix Request);- 0009H (DSMIPv6 IPv4 Home Agent Address Request);- 000AH (IP address allocation via NAS signalling);- 000BH (IPv4 address allocation via DHCPv4);- 000CH (P-CSCF IPv4 Address Request);- 000DH (DNS Server IPv4 Address Request);- 000EH (MSISDN Request);- 000FH (IFOM-Support-Request);- 0010H (IPv4 Link MTU Request);- 0011H (MS support of Local address in TFT indicator);- 0012H (P-CSCF Re-selection support);- 0013H (NBIFOM request indicator);- 0014H (NBIFOM mode);- 0015H (Non-IP Link MTU Request);- 0016H (APN rate control support indicator);- 0017H (3GPP PS data off UE status);- 0018H (Reliable Data Service request indicator);- 0019H (Additional APN rate control for exception data support indicator);- 001AH (PDU session ID);- 001BH (reserved);- 001CH (Reserved);- 001DH (Reserved);- 001EH (Reserved);- 001FH (Reserved);- 0020H (Ethernet Frame Payload MTU Request);- 0021H (Unstructured Link MTU Request);- 0022H (5GSM cause value);- 0023H (QoS rules with the length of two octets support indicator);- 0024H (QoS flow descriptions with the length of two octets support indicator);- 0025H (Reserved)- 0026H (Reserved);- 0027H (ACS information request);-- 0028H (Reserved);- 0029H (Reserved);- 0030H (ATSSS request);- 0031H (DNS server security information indicator); and- FF00H to FFFFH reserved for operator specific use.Network to MS direction:- 0001H (P-CSCF IPv6 Address);- 0002H (IM CN Subsystem Signaling Flag);- 0003H (DNS Server IPv6 Address);- 0004H (Policy Control rejection code);- 0005H (Selected Bearer Control Mode);- 0006H (Reserved);- 0007H (DSMIPv6 Home Agent Address) ;- 0008H (DSMIPv6 Home Network Prefix);- 0009H (DSMIPv6 IPv4 Home Agent Address);- 000AH (Reserved);- 000BH (Reserved); - 000CH (P-CSCF IPv4 Address);- 000DH (DNS Server IPv4 Address);- 000EH (MSISDN);- 000FH (IFOM-Support);- 0010H (IPv4 Link MTU);- 0011H (Network support of Local address in TFT indicator);- 0012H (Reserved);- 0013H (NBIFOM accepted indicator);- 0014H (NBIFOM mode);- 0015H (Non-IP Link MTU);- 0016H (APN rate control parameters);- 0017H (3GPP PS data off support indication);- 0018H (Reliable Data Service accepted indicator);- 0019H (Additional APN rate control for exception data parameters);- 001AH (reserved);- 001BH (S-NSSAI);- 001CH (QoS rules);- 001DH (Session-AMBR);- 001EH (PDU session address lifetime);- 001FH (QoS flow descriptions);- 0020H (Ethernet Frame Payload MTU);- 0021H (Unstructured Link MTU);- 0022H (Reserved);- 0023H (QoS rules with the length of two octets); - 0024H (QoS flow descriptions with the length of two octets);- 0025H (Small data rate control parameters);- 0026H (Additional small data rate control for exception data parameters);- 0027H (ACS information);- 0028H (Initial small data rate control parameters); - 0029H (Initial additional small data rate control for exception data parameters);- 0030H (ATSSS response with the length of two octets); - 0031H (DNS server security information with length of two octets); and- FF00H to FFFFH reserved for operator specific use.If the *additional parameters list* contains a container identifier that is not supported by the receiving entity the corresponding unit shall be ignored.The *container identifier* field is encoded as the *protocol identifier* field and the *length of container identifier contents* field is encoded as the *length of the protocol identifier contents* field.When the *container identifier* indicates P-CSCF IPv6 Address Request, DNS Server IPv6 Address Request, MSISDN Request or DNS server security information indicator, the *container identifi*er contents field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored. The DNS server security information indicator indicates that the MS supports receiving DNS server security information with length of two octets with the length of two octets.When the *container identifier* indicates IM CN Subsystem Signaling Flag (see 3GPP TS 24.229 [95]), the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored. In Network to MS direction this information may be used by the MS to indicate to the user whether the requested dedicated signalling PDP context was successfully established.When the *container identifier* indicates P-CSCF IPv6 Address, the *container identifier contents* field contains one IPv6 address corresponding to a P-CSCF address (see 3GPP TS 24.229 [95]). This IPv6 address is encoded as a 128-bit address according to IETF RFC 4291 [99]. When there is a need to include more than one P-CSCF IPv6 address, then more logical units with the *container identifier* indicating P-CSCF IPv6 Address are used. If more than 3 instances of the P‑CSCF IPv6 Address logical unit are received by the MS, then the MS may ignore all but the first 3 instances of the P‑CSCF IPv6 Address logical unit received.When the *container identifier* indicates DNS Server IPv6 Address, the *container identifier contents* field contains one IPv6 DNS server address (see 3GPP TS 27.060 [36a]). This IPv6 address is encoded as a 128-bit address according to IETF RFC 4291 [99]. When there is a need to include more than one DNS Server IPv6 address, then more logical units with the *container identifier* indicating DNS Server IPv6 Address are used.When the *container identifier* indicates Policy Control rejection code, the *container identifier contents* field contains a Go interface related cause code from the GGSN to the MS (see 3GPP TS 29.207 [100]). The *length of container identifier contents* indicates a length equal to one. If the *container identifier contents* field is empty or its actual length is greater than one octet, then it shall be ignored by the receiver.When the *container identifier* indicates MS Support of Network Requested Bearer Control indicator, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored.When the *container identifier* indicates Selected Bearer Control Mode, the *container identifier contents* field contains the selected bearer control mode, where ‘01H’ indicates that ‘MS only’ mode has been selected and ‘02H’ indicates that ‘MS/NW’ mode has been selected. The *length of container identifier contents* indicates a length equal to one. If the *container identifier contents* field is empty or its actual length is greater than one octet, then it shall be ignored by the receiver.When the *container identifier* indicates DSMIPv6 Home Agent Address Request, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored.When the *container identifier* indicates DSMIPv6 Home Network Prefix Request, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored.When the *container identifier* indicates DSMIPv6 IPv4 Home Agent Address Request, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored.When the *container identifier* indicates DSMIPv6 Home Agent Address, the *container identifier contents* field contains one IPv6 address corresponding to a DSMIPv6 HA address (see 3GPP TS 24.303 [124] and 3GPP TS 24.327 [125]). This IPv6 address is encoded as a 128-bit address according to IETF RFC 4291 [99]. When the *container identifier* indicates DSMIPv6 Home Network Prefix, the *container identifier contents* field contains one IPv6 Home Network Prefix (see 3GPP TS 24.303 [124] and 3GPP TS 24.327 [125]). This IPv6 prefix is encoded as an IPv6 address according to IETF RFC 4291 [99] followed by 8 bits which specifies the prefix length.When the *container identifier* indicates DSMIPv6 IPv4 Home Agent Address, the *container identifier contents* field contains one IPv4 address corresponding to a DSMIPv6 IPv4 Home Agent address (see 3GPP TS 24.303 [124] and 3GPP TS 24.327 [125]).When the *container identifier* indicates P-CSCF IPv4 Address Request, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored.When the *container identifier* indicates DNS Server IPv4 Address Request, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored.When the *container identifier* indicates P-CSCF IPv4 Address, the *container identifier contents* field contains one IPv4 address corresponding to the P-CSCF address to be used. When there is a need to include more than one P‑CSCF IPv4 address, then more logical units with the *container identifier* indicating P‑CSCF IPv4 Address are used. If more than 3 instances of the P‑CSCF IPv4 Address logical unit are received by the MS, then the MS may ignore all but the first 3 instances of the P‑CSCF IPv4 Address logical unit received.When the *container identifier* indicates DNS Server IPv4 Address, the *container identifier contents* field contains one IPv4 address corresponding to the DNS server address to be used. When there is a need to include more than one DNS Server IPv4 address, then more logical units with the *container identifier* indicating DNS Server IPv4 Address are used.P-CSCF IPv4 Address Request, P-CSCF IPv4 Address, DNS Server IPv4 Address Request and DNS Server IPv4 Address are applicable only in S1-mode.When the *container identifier* indicates IP address allocation via NAS signalling, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored.When the *container identifier* indicates IP address allocation via DHCPv4, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored.When the container identifier indicates MSISDN, the container identifier contents field contains the MSISDN (see 3GPP TS 23.003 [10]) assigned to the MS. Use of the MSISDN provided is defined in subclause 6.4.When the *container identifier* indicates IFOM Support Request (see 3GPP TS 24.303 [124] and 3GPP TS 24.327 [125]), the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored.When the *container identifier* indicates IFOM Support, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored. This information indicates that the Home Agent supports IFOM.When the *container identifier* indicates IPv4 Link MTU Request, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored.When the *container identifier* indicates IPv4 Link MTU, the *length of container identifier contents* indicates a length equal to two. The *container identifier contents* field contains the binary coded representation of the IPv4 link MTU size in octets. Bit 8 of the first octet of the *container identifier contents* field contains the most significant bit and bit 1 of the second octet of the *container identifier contents* field contains the least significant bit. If the *length of container identifier contents* is different from two octets, then it shall be ignored by the receiver.When the *container identifier* indicates MS support of Local address in TFT, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored. This information indicates that the MS supports Local address in TFTs.When the *container identifier* indicates Network support of Local address in TFT, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored. This information indicates that the network supports Local address in TFTs.When the *container identifier* indicates P-CSCF Re-selection support, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored. This PCO parameter may be present only if a container with P-CSCF IPv4 Address Request or P-CSCF IPv6 Address Request is present. This information indicates that the UE supports P-CSCF re-selection based on procedures specified in 3GPP TS 24.229 [95] subclauses B.2.2.1C, L.2.2.1C, R.2.2.1C, U.2.2.1C and W.2.2.1C.When the *container identifier* indicates NBIFOM request indicator, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored. This information indicates that the MS requests the NBIFOM usage.When the *container identifier* indicates NBIFOM accepted indicator, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored. This information indicates that the network accepts UE's request of the NBIFOM usage.When the *container identifier* indicates NBIFOM mode, the *length of container identifier contents* indicates a length equal to one. If the *length of container identifier contents* indicates length different to one, it shall be ignored. The *container identifier contents* field containing value 00H indicates the UE-initiated NBIFOM mode. The *container identifier contents* field containing value 01H indicates the network-initiated NBIFOM mode. The *container identifier contents* field containing a value other than 00H and other than 01H shall be ignored.When the *container identifier* indicates Non-IP Link MTU Request, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored. This information indicates that the MS requests link MTU for "non-IP" PDN connection.When the *container identifier* indicates Non-IP Link MTU, the *length of container identifier contents* indicates a length equal to two. The *container identifier contents* field contains the binary coded representation of the link MTU size for non-IP PDN connection in octets which is at least 128 octets. Bit 8 of the first octet of the *container identifier contents* field contains the most significant bit and bit 1 of the second octet of the *container identifier contents* field contains the least significant bit. If the *length of container identifier contents* is different from two octets, then it shall be ignored by the receiver.When the *container identifier* indicates APN rate control support indicator, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored. This information indicates that the MS supports APN rate control functionality.When the *container identifier* indicates APN rate control parameters, the *container identifier contents* field contains parameters for APN rate control functionality. The container contents are coded as described in subclause 10.5.6.3.2.When the *container identifier* indicates 3GPP PS data off UE status, the *container identifier contents* field contains information of the status of 3GPP PS data off in the UE for a PDN connection where "01H" indicates ’deactivated’ and "02H" indicates ‘activated’. The *length of container identifier contents* indicates a length equal to one. If the *container identifier contents* field is empty or its actual length is greater than one octet, then it shall be ignored by the receiver.When the *container identifier* indicates 3GPP PS data off support indication, the *container identifier contents* field is empty. The *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, then it shall be ignored by the receiver.When the *container identifier* indicates Reliable Data Service request indicator, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored. This information indicates that the MS requests the Reliable Data Service usage as specified in 3GPP TS 24.250 [162].When the *container identifier* indicates Reliable Data Service accepted indicator, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored. This information indicates that the network accepts UE's request of the Reliable Data Service usage as specified in 3GPP TS 24.250 [162].When the *container identifier* indicates Additional APN rate control for exception data support indicator, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored. This information indicates that the MS supports additional APN rate control for exception data functionality.When the *container identifier* indicates Additional APN rate control for exception data parameters, the *container identifier contents* field contains parameters for additional APN rate control for exception data functionality. The container contents are coded as described in subclause 10.5.6.3.3.When the *container identifier* indicates PDU session identity, the *container identifier contents* field contains the PDU session identity assigned by the MS. The encoding of the PDU session identity and its usage are defined in 3GPP TS 24.007 [20].When the *container identifier* indicates S-NSSAI, the *container identifier contents* field contains one S-NSSAI value followed by one PLMN ID that the S-NSSAI relates to. The S-NSSAI value is coded as the value part of S-NSSAI information element as specified in subclause 9.11.2.8 of 3GPP TS 24.501 [167]. The PLMN ID is encoded as the value of the PLMN identity of the CN operator IE in subclause 10.5.5.36. The usage of the S-NSSAI and the associated PLMN ID is defined in 3GPP TS 24.501 [167].When the *container identifier* indicates QoS rules, the *container identifier contents* field contains the QoS rules for the QoS flow corresponding to the EPS bearer of the PDN connection. The QoS rules is coded as the value part of QoS rules information element as specified in subclause 9.11.4.13 of 3GPP TS 24.501 [167]. The usage of the QoS rules is specified in 3GPP TS 24.501 [167].When the *container identifier* indicates Session-AMBR, the *container identifier contents* field contains the Session-AMBR for the PDU session corresponding to the PDN connection. The Session-AMBR is coded as the value part of Session-AMBR information element as specified in subclause 9.11.4.14 of 3GPP TS 24.501 [167]. The usage of the Session-AMBR is specified in 3GPP TS 24.501 [167].When the *container identifier* indicates PDU session address lifetime, the *length of container identifier contents* indicates a length equal to two. The *container identifier contents* field contains the binary coded representation of how long the network is willing to maintain the PDU session in units of seconds. Bit 8 of the first octet of the *container identifier contents* field contains the most significant bit and bit 1 of the second octet of the *container identifier contents* field contains the least significant bit. If the *length of container identifier contents* is different from two octets, then it shall be ignored by the receiver.When the *container identifier* indicates QoS flow descriptions, the *container identifier contents* field contains the QoS flow descriptions for the QoS flow corresponding to the EPS bearer of the PDN connection. The QoS flow descriptions is coded as the value part of QoS flow descriptions information element as specified in subclause 9.11.4.12 of 3GPP TS 24.501 [167]. The usage of the QoS flow descriptions is specified in 3GPP TS 24.501 [167].When the *container identifier* indicates Ethernet Frame Payload MTU Request, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored. This information indicates that the MS requests link MTU for an Ethernet PDU session.When the *container identifier* indicates Ethernet Frame Payload MTU, the *length of container identifier contents* indicates a length equal to two. The *container identifier contents* field contains the binary coded representation of Ethernet frame payload MTU size, i.e. the maximum size of a payload of an Ethernet frame which can be sent via an Ethernet PDU session in octets. Bit 8 of the first octet of the *container identifier contents* field contains the most significant bit and bit 1 of the second octet of the *container identifier contents* field contains the least significant bit. If the *length of container identifier contents* is different from two octets, then it shall be ignored by the receiver.When the *container identifier* indicates Unstructured Link MTU Request, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored. This information indicates that the MS requests link MTU for an Unstructured PDU session.When the *container identifier* indicates Unstructured Link MTU, the *length of container identifier contents* indicates a length equal to two. The *container identifier contents* field contains the binary coded representation of unstructured link MTU size, i.e. the maximum size of a message which can be sent via an Unstructured PDU session in octets. Bit 8 of the first octet of the *container identifier contents* field contains the most significant bit and bit 1 of the second octet of the *container identifier contents* field contains the least significant bit. If the *length of container identifier contents* is different from two octets, then it shall be ignored by the receiver.When the *container identifier* indicates 5GSM cause value, the *container identifier contents* field contains a 5GSM cause value. The encoding of the 5GSM cause value and its usage are specified in 3GPP TS 24.501 [167].When the *container identifier* indicates QoS rules with the length of two octets support indicator, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored. The *length of container identifier contents* field consists of one octet. This information indicates that the MS supports receiving QoS rules with the length of two octets.When the *container identifier* indicates QoS flow descriptions with the length of two octets support indicator, the *container identifier contents* field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored. The *length of container identifier contents* field consists of one octet. This information indicates that the MS supports receiving QoS flow descriptions with the length of two octets.When the *container identifier* indicates QoS rules with the length of two octets, the *container identifier contents* field contains the QoS rules for the QoS flow corresponding to the EPS bearer of the PDN connection if the MS has indicated the support of receiving QoS rules with the length of two octets. The QoS rules with the length of two octets is coded as the value part of QoS rules information element as specified in subclause 9.11.4.13 of 3GPP TS 24.501 [167]. The usage of the QoS rules is specified in 3GPP TS 24.501 [167]. See NOTE 2.When the *container identifier* indicates QoS flow descriptions with the length of two octets, the *container identifier contents* field contains the QoS flow descriptions for the QoS flow corresponding to the EPS bearer of the PDN connection if the MS has indicated the support of receiving QoS flow descriptions with the length of two octets. The QoS flow descriptions with the length of two octets is coded as the value part of QoS flow descriptions information element as specified in subclause 9.11.4.12 of 3GPP TS 24.501 [167]. The usage of the QoS flow descriptions is specified in 3GPP TS 24.501 [167]. See NOTE 2.When the *container identifier* indicates Small data rate control parameters, the *container identifier contents* field contains parameters for small data rate control functionality. The container contents are coded as described in subclause 10.5.6.3.4.When the *container identifier* indicates Initial small data rate control parameters, the *container identifier contents* field contains status parameters for small data rate control functionality. The container contents are coded as described in subclause 10.5.6.3.6.When the *container identifier* indicates Additional small data rate control for exception data parameters, the *container identifier contents* field contains parameters for additional small data rate control for exception data functionality. The container contents are coded as described in subclause 10.5.6.3.5.When the *container identifier* indicates Initial additional small data rate control for exception data parameters, the *container identifier contents* field contains status parameters for additional small data rate control for exception data functionality. The container contents are coded as described in subclause 10.5.6.3.7.When the *container identifier* indicates ACS information request, the *container identifi*er contents field is empty and the *length of container identifier contents* indicates a length equal to zero. If the *container identifier contents* field is not empty, it shall be ignored. This information indicates that the MS requests ACS information.When the *container identifier* indicates ACS information, the *length of container identifier contents* indicates non-zero length. The *container identifier contents* field contains the UTF-8 (see IETF RFC 3629 [168]) coded representation of an ACS URL. Bit 8 of the first octet of the *container identifier contents* field contains the most significant bit and bit 1 of the last octet of the *container identifier contents* field contains the least significant bit.When the *container identifier* indicates ATSSS request, the *container identifier contents* field is coded according to 3GPP TS 24.193 [171] subclause 6.1.6.2. The length of container identifier contents field consists of one octet. This information indicates that the MS supports receiving ATSSS response with the length of two octets.When the *container identifier* indicates ATSSS response with the length of two octets, the *container identifier contents* field is coded according to 3GPP TS 24.193 [171] subclause 6.1.6.3. See NOTE 2.When the *container identifier* indicates DNS server security information with length of two octets, the *container identifier contents* field contains one of the parameters; security protocol type TLS or DTLS, port number, authentication domain name, SPKI pin sets, root certificate, raw public key. When there is a need to send more than one DNS server security information with length of two octets parameter, then multiple containers with the *container identifier* indicating DNS server security information with length of two octets are used, each containing one parameter. The first octet of content of the DNS server security information with length of two octets contains the type of DNS server security information with length of two octets element and the content field excluding the first field of the DNS server security information with length of two octets contains value part. If the DNS server security information with length of two octets contains security protocol type then the DNS server security information with length of two octets type is set to 0x00 and the value part is set to 0x00 if the security protocol type is TLS (see IETF RFC 7858 [172]) and 0x01 if the security protocol type is DTLS (see IETF RFC 8094 [173]). If the DNS server security information with length of two octets contains Port Number then the DNS server security information with length of two octets type is set to 0x01 and the value part to content is set ephemeral port (see IETF RFC 6056 [174]). If the DNS server security information with length of two octets contains Authentication Domain Name then the DNS server security information with length of two octets type is set to 0x02 and the value part to content is set Authentication Domain Name (The FQDN shall be encoded as defined in IEFT RFC 1035 [175]). If the DNS server security information with length of two octets contains SPKI pin set then the DNS server security information with length of two octets type is set to 0x03 and the value part to content is set SPKI pin set (The SPKI pin set shall be encoded as in DER as specified in X 690.3[179]. See section 2.4 of IETF RFC 7469 [176]). If the DNS server security information with length of two octets contains Root Certificatethen the DNS server security information with length of two octets the type is set to 0x04 and the value part to content is set root certificate (the root certificate is encoded as in DER as specified in X 690[179]. See see section 2.3.1 of IETF RFC 6125 [177]). If the DNS server security information with length of two octets contains Raw Public key then the DNS server security information with length of two octets.type is set to 0x05 and the value part to content is set Raw Public key (The Raw Public Key shall be encoded as in DER as specified in X 690.3[179]. See section 3 of IETF RFC 7250 [178]).When the container identifier indicates operator specific use, the Container contents starts with MCC and MNC of the operator providing the relevant application and can be followed by further application specific information. The coding of MCC and MNC is as in octet 2 to 4 of the *Location Area Identification* information element in subclause 10.5.1.3.NOTE 1: The *additional parameters list* and the *configuration protocol options list* are logically separated since they carry different type of information. The beginning of the *additional parameters list* is marked by a logical unit, which has an identifier (i.e. the first two octets) equal to a *container identifier* (i.e. it is not a *protocol identifier*).NOTE 2: If the QoS rules with the length of two octets, the QoS flow descriptions with the length of two octets, ATSSS response with the length of two octets is included, or DNS server security information with length of two octets, then extended protocol configuration options as specified in the subclause 10.5.6.3A shall be used. |