**3GPP TSG-CT WG1 Meeting #132-eC1-21**

**E-meeting, 11-15 October 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **24.008** | **CR** | **3286** | **rev** | **1** | **Current version:** | **17.4.0** |  |
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| *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** |

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| ***Title:*** | Update on ECS configuration information | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Qualcomm Incorporated | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | eEDGE\_5GC | | | | |  | ***Date:*** | | | 09/25/2021 |
|  |  | | | |  | |  | | |  |
| ***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)* | |
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| ***Reason for change:*** | | As per S2-2106749 and S2-2106748 (CR3113 against TS 23.502), it was agreed to provide spatial validity condition to the UE as a part of ECS configuration information as follows:  TS 23.548:  6.5.2.2 ECS Address Configuration information Provisioning to the UE  If the UE hosts an EEC and supports transferring the ECS address received from the 5GC to the EEC, the UE indicates in the PCO at PDU Session establishment that it supports the ability to receive ECS address(es) via NAS and to transfer the ECS Address(es) to the EEC(s) (see TS 23.502 [3]). As described in TS 23.502 [3], if the UE supports the ability to receive ECS Address Configuration Information via NAS and to transfer the ECS Address(es) to the EEC(s), the UE may receive ECS Address Configuration Information from the SMF via PCO during PDU Session Establishment and/or during PDU Session Modification procedures. If Spatial Validity Condition of ECS is provided, the UE uses the appropriate ECS FQDN as defined in TS 23.558 [5].  TS 23.502:   |  |  | | --- | --- | | ECS Address Configuration Information | Consists of  - one or more FQDN(s) and/or IP Address(es) of Edge Configuration Server(s),  - An ECS Provider ID. The identifier of the Edge Configuration Server (ECS) Provider (such as Edge Computing Service Provider),  - Spatial Validity Condition per Edge Configuration Server, which may correspond to one of following alternatives:  - a geographical area,  - a Presence Reporting Area,  - a list of TA(s),  - a list of countries (list of MCC),  where ECS Address Configuration Information is applicable. |   Therefore, encoding of procotol configuration option needs to capture above information.  Please note that “a Presence Reporting Area’ is not applicable to the UE so it should not be a part of ECS configuration information. | | | | | | | | |
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| ***Summary of change:*** | | Adding spatial validity condition per ECS in the ECS configuration information of PCO | | | | | | | | |
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| ***Consequences if not approved:*** | | Encoding of the spatial validity condition per ECS is missing. | | | | | | | | |
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| ***Clauses affected:*** | | 10.5.6.3.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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's revision history:*** | |  | | | | | | | | |

1ST CHANGE

##### 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 | |
| 1 ext | 0 0 0 0 Spare | | | | Configuration protocol | | | | octet 3 | |
| Protocol ID 1 | | | | | | | | | octet 4 octet 5 | |
| Length of protocol ID 1 contents | | | | | | | | | octet 6 | |
| Protocol ID 1 contents | | | | | | | | | octet 7  octet m | |
| Protocol ID 2 | | | | | | | | | octet m+1 octet m+2 | |
| Length of protocol ID 2 contents | | | | | | | | | octet m+3 | |
| Protocol ID 2 contents | | | | | | | | | octet m+4  octet n | |
| . . . | | | | | | | | | octet n+1  octet u | |
| Protocol ID n-1 | | | | | | | | | octet u+1 octet u+2 | |
| Length of protocol ID n-1 contents | | | | | | | | | octet u+3 | |
| Protocol ID n-1 contents | | | | | | | | | octet u+4  octet v | |
| Protocol ID n | | | | | | | | | octet v+1 octet v+2 | |
| Length of protocol ID n contents | | | | | | | | | octet v+3 | |
| Protocol ID n contents | | | | | | | | | octet v+4  octet w | |
| Container ID 1 | | | | | | | | | octet w+1  octet w+2 | |
| Length of container ID 1 contents | | | | | | | | | octet w+3 | |
| Container ID 1 contents | | | | | | | | | octet w+4  octet x | |
| . . . | | | | | | | | | octet x+1  octet y | |
| Container ID n | | | | | | | | | octet y+1  octet y+2 | |
| Length of container ID n contents | | | | | | | | | octet y+3 | |
| Container ID n contents | | | | | | | | | octet y+4  octet z | |
| Container ID n+1 | | | | | | | | | octet z+1  octet z+2 | |
| Length of container ID n+1 contents (see NOTE) | | | | | | | | | octet z+3  octet z+4 | |
| Container ID n+1 contents | | | | | | | | | octet z+5  octet za | |
| NOTE: If the container ID is:  - 0023H (QoS rules with the length of two octets);  - 0024H (QoS flow descriptions with the length of two octets);  - 0030H (ATSSS response with the length of two octets); or  - 0031H (DNS server security information with length of two octets);  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) Bits 3 2 1 0 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 za).  **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) (see NOTE 3); - C223H (CHAP) (see NOTE 3); 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: LCP is specified in RFC 1661 [102], PAP is specified in RFC 1334 [179], CHAP is specified in RFC 1994 [180] and IPCP is specified in RFC 1332 [181].  **Additional parameters list** (octets w+1 to za)  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) (see NOTE 4);  - 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);  - 002AH (Reserved);  - 002BH (Reserved);  - 0030H (ATSSS request);  - 0031H (DNS server security information indicator);  - 0032H (ECS configuration information provisioning support indicator);  - 0033H (Reserved);  - 0034H (Reserved);  - 0035H (Reserved);  - 0036H (Reserved);  - 0037H (Reserved);  - 0038H (Reserved);  - 0039H (DNS server security protocol support);  - 003AH (EAS rediscovery support indication);  - 003BH (Reserved);  - 003CH (Reserved);  - 003DH (Reserved); 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);  - 002AH (Initial APN rate control parameters);  - 002BH (Initial additional APN 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);  - 0032H (ECS IPv4 address);  - 0033H (ECS IPv6 address);  - 0034H (ECS FQDN);  - 0035H (ECS provider identifier);  - 0036H (PVS IPv4 Address);  - 0037H (PVS IPv6 Address);  - 0038H (PVS name);  - 0039H (reserved);  - 003AH (EAS rediscovery indication without indicated impact);  - 003BH (EAS rediscovery indication with impacted EAS IPv4 address range);  - 003CH (EAS rediscovery indication with impacted EAS IPv6 address range);  - 003DH (EAS rediscovery indication with impacted EAS FQDN);  - 00XXH (Spatial validity condition for ECS IPv4 address);  - 00XXH (Spatial validity condition for ECS IPv6 address);  - 00XXH (Spatial validity condition for ECS FQDN); 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. When the DNS Server IPv6 Address Request is indicated in N1 mode, the DNS Server IPv6 Address Request indicates that the MS supports handling of the DNS Server IPv6 address(es) received in the PDU session establishment procedure and network-requested PDU session modification procedure(s), if any.  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 DNS Server IPv4 Address Request is indicated in N1 mode, the DNS Server IPv4 Address Request indicates that the MS supports handling of the DNS Server IPv4 address(es) received in the PDU session establishment procedure and network-requested PDU session modification procedure(s), if any.  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 in S1-mode and N1-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 Initial APN data rate control parameters, the *container identifier contents* field contains status parameters for APN rate control functionality. The container contents are coded as described in subclause 10.5.6.3.8.  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 Initial additional APN rate control for exception data parameters, the *container identifier contents* field contains status parameters for additional APN rate control for exception data functionality. The container contents are coded as described in subclause 10.5.6.3.9.  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, port number, authentication domain name, SPKI pin sets, root certificate, raw public key.  When there is a need to send more than one 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 *container identifier contents* of the DNS server security information with length of two octets contains the type and all octets excluding the first octet of the *container identifier contents field* of the DNS server security information with length of two octets contain the value part. If the DNS server security information with length of two octets contains security protocol type then the 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 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 type is set to 0x02 and the value part 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 type is set to 0x03 and the value part is set SPKI pin set (The SPKI pin set shall be encoded as in DER as specified in X 690.3 [177]). If the DNS server security information with length of two octets contains a root certificate then the type is set to 0x04 and the value part is set the root certificate (the root certificate is encoded as in DER as specified in X 690 [177]). If the DNS server security information with length of two octets contains raw public key then the type is set to 0x05 and the value part is set to raw public key (The raw public key shall be encoded as in DER as specified in X 690.3 [177]). See NOTE 2.  If the DNS server security information indicator or the DNS server security protocol support is included by the MS, the network may configure the UE with the DNS server security information. If the MS includes DNS server security information indicator but does not include the DNS server security protocol support, the network may configure the UE with both security protocols TLS and DTLS.  When the *container identifier* indicates DNS server security protocol support, the *container identifier contents* field contains the parameter security protocol type. The first octet of *container identifier contents* of the DNS server security protocol support with length of one octet contains the security protocol type. If the security protocol type is is set to 0x01 the UE indicates the support of the security protocol TLS (see IETF RFC 7858 [172]) and if it is set to 0x02 the UE indicates the support of the security protocol DTLS (see IETF RFC 8094 [173]), all other values are spare. When there is a need to send more than one parameter, then multiple containers with the *container identifier* indicating DNS server security protocol support with length of one octet are used, each containing one parameter.  When the *container identifier* indicates ECS configuration information provisioning support indicator (related to ECS IPv4 Address, ECS IPv6 Address, ECS FQDN and ECS provider identifier), 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 to receive ECS configuration information. The usage of ECS configuration information provisioning support indicator is specified in 3GPP TS 24.501 [167].  When the *container identifier* indicates ECS IPv4 Address, the *container identifier contents* field contains one IPv4 address of an ECS. When there is a need to include more than one ECS IPv4 address, then more logical units with the *container identifier* indicating ECS IPv4 Address are used. The usage of ECS IPv4 Address is specified in 3GPP TS 24.501 [167].  When the *container identifier* indicates Spatial validity condition for ECS IPv4 Address, the *container identifier contents* field contains a spatial validity condition, which is constructed as either a geographic area, a list of TAI(s), or a list of MCC, as specified in 3GPP TS 23.548 [182] where the IP address of an ECS is applicable. The usage of spatial validity condition per ECS is specified in 3GPP TS 24.501 [167].  When the *container identifier* indicates ECS IPv6 Address, the *container identifier contents field* contains one IPv6 address of an ECS. 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 ECS IPv6 address, then more logical units with the *container identifier* indicating ECS IPv6 Address are used. The usage of ECS IPv6 Address is specified in 3GPP TS 24.501 [167].  When the *container identifier* indicates Spatial validity condition for ECS IPv6 Address, the *container identifier contents* field contains a spatial validity condition, which is constructed as either a geographic area, a list of TAI(s), or a list of MCC, as specified in 3GPP TS 23.548 [182] where the IP address of an ECS is applicable. The usage of spatial validity condition per ECS is specified in 3GPP TS 24.501 [167].  When the *container identifier* indicates ECS FQDN, the *container identifier contents field* contains one ECS FQDN of an ECS. The FQDN is constructed as specified in subclause 19.4.2 of 3GPP TS 23.003 [10]. When there is a need to include more than one ECS FQDN, then more logical units with the *container identifier* indicating ECS FQDN are used. The usage of ECS FQDN is specified in 3GPP TS 24.501 [167]. See NOTE 5.  When the *container identifier* indicates Spatial validity condition for ECS FQDN, the *container identifier contents* field contains a spatial validity condition, which is constructed as either a geographic area, a list of TAI(s), or a list of MCC, as specified in 3GPP TS 23.548 [182] where the IP address of an ECS is applicable. The usage of spatial validity condition per ECS is specified in 3GPP TS 24.501 [167].  Editor’s note: The format of Spatial validity condition is FFS.  When the *container identifier* indicates ECS provider identifier, the *container identifier contents field* contains one ECS provider identifier (see 3GPP TS 24.588 [r24588]. There can only be one ECS provider identifier logical unit. In case there are more than one logical unit(s), the first logical unit shall be treated, and the following logical unit(s) shall be ignored. The usage of ECS provider identifier is specified in 3GPP TS 24.501 [167].  Editor’s note: The ECS provider identifier format is FFS.  When the *container identifier* indicates PVS IPv4 Address, the *container identifier contents* field contains one IPv4 address corresponding to the PVS address to be used. When there is a need to include more than one PVS IPv4 address, then more logical units with the *container identifier* indicating PVS IPv4 Address are used.  When the *container identifier* indicates PVS IPv6 Address, the *container identifier contents* field contains one IPv6 PVS address. 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 PVS IPv6 address, then more logical units with the *container identifier* indicating PVS IPv6 Address are used.  When the *container identifier* indicates PVS name, the *container identifier contents* field contains a fully qualified domain name according to DNS naming conventions (see 3GPP TS 23.003 [10]). When there is a need to include more than one PVS name, then more logical units with the *container identifier* indicating PVS name are used.  When the *container identifier* indicates EAS rediscovery support indication, either the *container identifier contents field* is empty and the length of *container identifier* contents indicates a length equal to zero, or the *container identifi*er contents field contains one octet long capability field. If the *container identifier contents field* is longer than one octet, the octets after the first octet of the *container identifier contents* shall be ignored by the receiving entity. EAS rediscovery support indication indicates that the sending entity supports handling of the EAS rediscovery indication without indicated impact received in PDU session modifications. Bit 1 of the capability field set to zero indicates that the sending entity does not support handling of the EAS rediscovery indication with impacted EAS IPv4 address range received in PDU session modifications. Bit 1 of the capability field set to one indicates that the sending entity supports handling of the EAS rediscovery indication with impacted EAS IPv4 address range received in PDU session modifications. Bit 2 of the capability field set to zero indicates that the sending entity does not support handling of the EAS rediscovery indication with impacted EAS IPv6 address range received in PDU session modifications. Bit 2 of the capability field set to one indicates that the sending entity supports handling of the EAS rediscovery indication with impacted EAS IPv6 address range received in PDU session modifications. Bit 3 of the capability field set to zero indicates that the sending entity does not support handling of the EAS rediscovery indication with impacted FQDN received in PDU session modifications. Bit 3 of the capability field set to one indicates that the sending entity supports handling of the EAS rediscovery indication with impacted FQDN received in PDU session modifications. Bits 4 to 8 of the capability field shall be set to zero by the sending entity and shall be ignored by the receiving entity. If the *container identifier contents field* is empty, the receiving entity shall consider that the *container identifier contents field* with the capability field with value 00H is received. The usage of EAS rediscovery support indication is specified in 3GPP TS 24.501 [167].  When the *container identifier* indicates EAS rediscovery indication without indicated impact, the *container identifier contents* field is empty and the length of *container identifier* contents indicates a length equal to zero. EAS rediscovery indication without indicated impact indicates that all EAS information(s) as specified in 3GPP TS 23.548 [182] need to be refreshed. If the *container identifier contents field* is not empty, it shall be ignored. The usage of EAS rediscovery indication without indicated impact is specified in 3GPP TS 24.501 [167].  When the *container identifier* indicates EAS rediscovery indication with impacted EAS IPv4 address range, the *container identifier contents* field contains binary encoded lowest IPv4 address of the EAS IPv4 address range followed by binary encoded highest IPv4 address of the EAS IPv4 address range, and the length of *container identifier* contents indicates eight. EAS rediscovery indication with impacted EAS IPv4 address range indicates IPv4 address(es) of EAS information(s) as specified in 3GPP TS 23.548 [182] which needs to be refreshed. When there is a need to include EAS rediscovery indication with more impacted EAS IPv4 address ranges, then more logical units with the *container identifier* indicating EAS rediscovery indication with impacted EAS IPv4 address range, are used. The usage of EAS rediscovery indication with impacted EAS IPv4 address range is specified in 3GPP TS 24.501 [167].  When the *container identifier* indicates EAS rediscovery indication with impacted EAS IPv6 address range, the *container identifier contents* field contains binary encoded lowest IPv6 address of the EAS IPv6 address range followed by binary encoded highest IPv6 address of the EAS IPv6 address range, and the length of *container identifier* contents indicates thirty two (decimal). EAS rediscovery indication with impacted EAS IPv6 address range indicates IPv6 address(es) of EAS information(s) as specified in 3GPP TS 23.548 [182] which needs to be refreshed. When there is a need to include EAS rediscovery indications with more impacted EAS IPv6 address ranges, then more logical units with the *container identifier* indicating EAS rediscovery indication with impacted EAS IPv6 address range, are used. The usage of EAS rediscovery indication with impacted EAS IPv6 address range is specified in 3GPP TS 24.501 [167].  When the *container identifier* indicates EAS rediscovery indication with impacted EAS FQDN, the *container identifier contents field* contains one EAS FQDN. EAS rediscovery indication with impacted EAS FQDN indicates an FQDN of EAS information as specified in 3GPP TS 23.548 [182] which needs to be refreshed. The FQDN is constructed as specified in subclause 19.4.2 of 3GPP TS 23.003 [10]. When there is a need to include EAS rediscovery indications with more impacted EAS FQDNs, then more logical units with the *container identifier* indicating EAS rediscovery indication with impacted EAS FQDN are used. The usage of EAS rediscovery indication with impacted EAS FQDN is specified in 3GPP TS 24.501 [167]. See NOTE 5.  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, or DNS server security information with length of two octets is included, then extended protocol configuration options as specified in the subclause 10.5.6.3A shall be used.  NOTE 3: If PAP/CHAP protocol is supported by the UE in N1 mode, the UE can use the PAP/CHAP protocol identifiers in the extended protocol configuration options information element in N1 mode.  NOTE 4: The MS operating in single-registration mode shall indicate the support of Local address in TFT in N1 mode as specified in subclause 6.4.1.2 of 3GPP TS 24.501 [167].  NOTE 5: The maximum length of an FQDN is 254 octets.  NOTE 6: The format of geographic area is out of scope of 3GPP. |