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Technical Specification

3rd Generation Partnership Project;

Technical Specification Group Services and System Aspects;

Circuit Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)

(Release 16)

** 

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# Foreword

This Technical Specification has been produced by the 3GPP.

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

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where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

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y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

# 0 Scope

The present document defines a set of Circuit Bearer Services to be provided to PLMN subscribers by a PLMN itself and in connection with other networks. This TS should also be used as a reference for defining the corresponding required mobile network capabilities.

## 0.1 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] TS 41.004: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".

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

[3] TS 22.004: " General on supplementary services".

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

[5] TS 27.002: " Terminal Adaptation Functions (TAF) for services using asynchronous bearer capabilities".

[6] TS 27.003: " Terminal Adaptation Functions (TAF) for services using synchronous bearer capabilities".

[7] TS 27.005: "Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)".

[8] TS 29.002: " Mobile Application Part (MAP) specification".

[9] 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)".

[10] TS 29.010: " Information element mapping between Mobile Station - Base Station System and BSS ‑ Mobile-services Switching Centre (MS - BSS - MSC) Signalling procedures and the Mobile Application Part (MAP)".

[11] TS 29.011: " Signalling interworking for supplementary services".

[12] ITU-T Recommendation V.120: "Support by an ISDN of data terminal equipments with V-series type interface with provision for statistical multiplexing".

[13] TR 21.905: "Vocabulary for 3GPP Specifications"

## 0.2 Abbreviations

Abbreviations used in this TS are listed in TS 41.004 [1] and TR 21.905 [13].

# 1 Framework for defining Circuit Bearer Services

Bearer Services are described by attributes, which are intended to be independent. These attributes are described and defined in TS 22.001 [2]. They are grouped into four categories:

i) Information transfer attributes, which characterize the network capabilities for transferring information from a user access point in a PLMN to a user access point in another network. (Refer to TS 22.001 [2] ).

ii) Access attributes, which describe the means for accessing network functions or facilities as seen at the access point in the PLMN (see TS 22.001 [2]).

iii) Interworking attributes, which describe properties of the terminating network and its access point. The terminating network may include another PLMN or the originating PLMN.

iv) General attributes, which deal with the service in general.

Figure 1 shows the relation between the groups of attributes and their fields of applicability.



NOTE 1: A transit network may not exist for a Bearer Service.

NOTE 2: Communication may be established from either end.

NOTE 3: The information transfer and access attributes of a Bearer Service relate to a direct peer-to-peer communication of:

- TE to TE;

- TE to a network gateway (supporting, for example, PSTN interworking); or

- network gateway to a TE.

Figure 1: Relation between the groups of attributes and fields of applicability

The following table lists the individual attributes in each of the four groups. The Bearer Service definitions in this specification are based on the "Minimal Set" of attributes.

Table 1: List of Bearer Service attributes

|  |  |  |
| --- | --- | --- |
|  |  | Minimal |
|  |  | Set |
| Information Transfer Attributes | |  |
|  | Information Transfer Mode | X |
|  | Information Transfer Rate | X |
|  | Information Transfer Capability | X |
|  | Establishment of Communication | X |
|  | Symmetry | X |
|  | Communication Configuration | X |
|  | Data Compression |  |
| Access Attributes | |  |
|  | Access Channel and Rate |  |
|  | Signalling Access Protocols |  |
|  | Information Access Protocols |  |
|  | Information Access Structure | X |
|  | Information Access Rate | X |
| Interworking Attributes | |  |
| General Attributes | |  |
|  | Supplementary Services Provided |  |
|  | Quality of Service | X |
|  | Operational and Commercial |  |

Attributes that are not part of the minimal set provide further technical detail and are required to fully define the use of each Bearer Service.

See specifications [4], [5], [6], [7] for information about the Signalling Access Protocols, Information Access Protocols and related access attributes.

Supplementary services are defined in TS 22.004 [3].

Intercommunication is required with services in the PSTN, ISDN and other PLMNs. The capabilities that describe the Interworking Attributes are described in specifications [8] to [9] and [15].

# 2 Bearer Service categories

All Bearer Service categories provide information transfer between the reference points and allow the use of sub-rate information streams which are rate-adapted.

The Bearer Services can be grouped into the following categories:

- Unrestricted Digital Information (UDI);

Provides the transfer of unrestricted digital information.

- 3,1 kHz (External to the PLMN);

Used to select a "3,1 kHz audio" interworking function at the MSC. This service category is used when interworking with the ISDN or PSTN "3,1 kHz audio" service and includes the capability to select a modem at the interworking function. "External to the PLMN" indicates that the "3,1 kHz audio" service is only used outside of the PLMN, in the ISDN/PSTN. The connection within the PLMN, user access point to the interworking function, is an unrestricted digital connection.

# 3 Bearer Services

This clause provides a list of the existing Bearer Services and indicates the values for each attribute in the minimal set.

The following attributes have the same value for all Bearer Services. Their values are as follows:

Information Transfer Mode: "Circuit";

Information Transfer Rate: Not applicable (note 1);

Establishment of Communication: "Demand";

Symmetry: "Bi-directional Symmetric";

Communication Configuration: "Point to point".

NOTE 1: The Information Transfer Rate attribute is not applicable because it depends on the reference point assumed in the PLMN, transit or terminating network.

All asynchronous NT Bearer Services may support data compression to enhance user data throughput.

NT Bearer Services 20 may support V.120 interworking, enabling data terminals connected to an UE to interwork with V.120 [12] terminal adapters on the ISDN as shown in the figure 2 below.



Figure 2: Model of V.120 Interworking

Table 2 contains the list of the Bearer Services and the values for the remaining attributes in the minimal set.

Table 2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Bearer Service Number | Bearer Service Name | Access Structure | Access Rate | Information Transfer Capability | QOS Attribute | Notes |
| 20 | Asynchronous General Bearer Service | Asynch | note 1 | 3.1 kHz , UDI, RDI | NT / T |  |
| 30 | Synchronous General Bearer Service | Synch | note 1 | 3.1 kHz , UDI, RDI | T |  |
| Note 1: This General Bearer is independent of any nominal rate. It is elaborated in more detail in subclause 3.1 | | | | | | |

## 3.1 General bearer service user data characteristics

The tables below describe the characteristics of the General Bearer Services. The indicated fixed network user rates are possible, but support of General Bearer Service does not imply support of all rates.

### 3.1.1 BS 20 (asynchronous services)

#### 3.1.1.1 BS 20 T (transparent asynchronous services)

##### 3.1.1.1.1 BS 20 transparent in regular mode for analogue interworking

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fixed Network User Rate | Access Structure | Information Transfer Capability | Rate Adaptation | QoS attributes | UTRAN | GERAN Iu mode | GERAN A/Gb mode | Notes |
| 0.3 kbit/s | Asynch | 3,1 kHz | - | T | - | - | Supported |  |
| 1.2 kbit/s | Asynch | 3,1 kHz | - | T | - | - | Supported |  |
| 2.4 kbit/s | Asynch | 3,1 kHz | - | T | - | - | Supported |  |
| 4.8 kbit/s | Asynch | 3,1 kHz | - | T | - | - | Supported |  |
| 9.6 kbit/s | Asynch | 3,1 kHz | - | T | - | - | Supported |  |
| 14.4 kbit/s | Asynch | 3,1 kHz | - | T | - | - | Supported |  |
| 19.2 kbit/s | Asynch | 3,1 kHz | - | T | - | - | Supported |  |
| 28.8 kbit/s | Asynch | 3,1 kHz | - | T | Supported | Supported | Supported |  |

##### 3.1.1.1.2 BS 20 transparent in regular mode for digital interworking

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fixed Network User Rate | Access Structure | Information Transfer Capability | Rate Adaptation | QoS Attribute | UTRAN | GERAN Iu mode | GERAN A/Gb mode | Notes |
| 0.3 kbit/s | Asynch | UDI | V.110 | T | - | - | Supported |  |
| 1.2 kbit/s | Asynch | UDI | V.110 | T | - | - | Supported |  |
| 2.4 kbit/s | Asynch | UDI | V.110 | T | - | - | Supported |  |
| 4.8 kbit/s | Asynch | UDI | V.110 | T | - | - | Supported |  |
| 9.6 kbit/s | Asynch | UDI | V.110 | T | - | - | Supported |  |
| 14.4 kbit/s | Asynch | UDI | V.110 | T | - | - | Supported |  |
| 19.2 kbit/s | Asynch | UDI | V.110 | T | - | - | Supported |  |
| 28.8 kbit/s | Asynch | UDI | V.110 | T | - | - | Supported |  |
| 38.4 kbit/s | Asynch | UDI | V.110 | T | - | - | Supported |  |

#### 3.1.1.2 BS 20 NT (non-transparent asynchronous services)

##### 3.1.1.2.1 BS 20 non-transparent in regular mode for analogue interworking

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fixed Network User Rate | Access Structure | Information Transfer Capability | Rate Adaptation | QoS attributes | UTRAN | GERAN Iu mode | GERAN A/Gb mode | Note |
| 0.3 kbit/s | Asynch | 3,1 kHz | - | NT | Supported | Supported | Supported | Note 2 |
| 1.2 kbit/s | Asynch | 3,1 kHz | - | NT | Supported | Supported | Supported | Note 2 |
| 2.4 kbit/s | Asynch | 3,1 kHz | - | NT | Supported | Supported | Supported | Note 2 |
| 4.8 kbit/s | Asynch | 3,1 kHz | - | NT | Supported | Supported | Supported | Note 2 |
| 9.6 kbit/s | Asynch | 3,1 kHz | - | NT | Supported | Supported | Supported |  |
| 14.4 kbit/s | Asynch | 3,1 kHz | - | NT | Supported | Supported | Supported |  |
| 19.2 kbit/s | Asynch | 3,1 kHz | - | NT | Supported | Supported | Supported |  |
| 28.8 kbit/s | Asynch | 3,1 kHz | - | NT | Supported | Supported | Supported |  |
|  |  |  |  |  |  |  |  |  |
|  | Asynch | 3,1 kHz | - | NT | Supported | Supported | Supported | Note 1 |

NOTE 1: This is used with high speed modems such as V.90 (56kbit/s). Modem type = 'Autobauding Type 1' is selected. FNUR has no meaning in this case.

NOTE 2: In case of UTRAN and in GERAN Iu mode the FNURs 300, 1200, 2400 and 4800 bit/s towards the fixed network can be provided only with modem type = 'Autobauding Type 1' is selected.

##### 3.1.1.2.2 BS 20 non-transparent in regular mode for digital interworking

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fixed Network User Rate | Access Structure | Information Transfer Capability | Rate Adaptation | QoS Attribute | UTRAN | GERAN Iu mode | GERAN A/Gb mode | Notes |
| 0.3 kbit/s | Asynch | UDI | V.110 | NT | Supported | Supported | Supported | Note 1 |
| 1.2 kbit/s | Asynch | UDI | V.110 | NT | Supported | Supported | Supported | Note 1 |
| 2.4 kbit/s | Asynch | UDI | V.110 | NT | Supported | Supported | Supported | Note 1 |
| 4.8 kbit/s | Asynch | UDI | V.110 | NT | Supported | Supported | Supported | Note 1 |
| 9.6 kbit/s | Asynch | UDI | V.110 | NT | Supported | Supported | Supported |  |
| 14.4 kbit/s | Asynch, | UDI | V.110 | NT | Supported | Supported | Supported |  |
| 19.2 kbit/s | Asynch | UDI | V.110 | NT | Supported | Supported | Supported |  |
| 28.8 kbit/s | Asynch | UDI | V.110 | NT | Supported | Supported | Supported |  |
| 38.4 kbit/s | Asynch | UDI | V.110 | NT | Supported | Supported | Supported |  |

NOTE 1: In case of UTRAN and in GERAN Iu mode the user rates 300, 1200, 2400 and 4800 bit/s towards the fixed network can be provided only for mobile terminated calls.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fixed Network User Rate | Access Structure | Information Transfer Capability | Rate Adaptation | QoS Attribute | UTRAN | GERAN Iu mode | GERAN A/Gb mode | Notes |
| 1.2 kbit/s | Asynch | UDI / RDI | V.120 | NT | Supported | Supported | Supported | Note 2 |
| 2.4 kbit/s | Asynch | UDI / RDI | V.120 | NT | Supported | Supported | Supported | Note 2 |
| 4.8 kbit/s | Asynch | UDI / RDI | V.120 | NT | Supported | Supported | Supported | Note 2 |
| 9.6 kbit/s | Asynch | UDI / RDI | V.120 | NT | Supported | Supported | Supported |  |
| 14.4 kbit/s | Asynch | UDI / RDI | V.120 | NT | Supported | Supported | Supported |  |
| 19.2 kbit/s | Asynch | UDI / RDI | V.120 | NT | Supported | Supported | Supported |  |
| 28.8 kbit/s | Asynch | UDI / RDI | V.120 | NT | Supported | Supported | Supported | Note 1 |
| 38.4 kbit/s | Asynch | UDI / RDI | V.120 | NT | Supported | Supported | Supported |  |
| 48 kbit/s | Asynch | UDI / RDI | V.120 | NT | Supported | Supported | Supported |  |
| 56 kbit/s | Asynch | UDI | V.120 | NT |  |  |  |  |

NOTE 1: Requires a new code point in V.120 specification to be defined.

NOTE 2: In case of UTRAN and in GERAN Iu mode the user rates 1200, 2400 and 4800 bit/s toward the fixed network can be provided only for mobile terminated calls.

##### 3.1.1.2.3 BS 20 non-transparent for PIAFS

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fixed Network User Rate | Access Structure | Information Transfer Capability | Rate Adaptation | QoS Attribute | UTRAN | GERAN Iu mode | GERAN A/Gb mode | Notes |
| 32 kbit/s | Asynch | UDI | PIAFS | NT | Supported | - | - |  |
| 64 kbit/s | Asynch | UDI | PIAFS | NT | Supported | - | - |  |

##### 3.1.1.2.4 BS 20 non-transparent for Frame Tunnelling Mode

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fixed Network User Rate | Access Structure | Information Transfer Capability | Rate Adaptation | QoS Attribute | UTRAN | GERAN Iu mode | GERAN A/Gb mode | Notes |
| 56kbit/s | Asynch | RDI | X.31 flag stuffing | NT | Supported | Supported | Supported |  |
| 64 kbit/s | Asynch | UDI | X.31 flag stuffing | NT | Supported | Supported | Supported |  |

### 3.1.2 BS 30 (synchronous services)

#### 3.1.2.1 BS 30 T (transparent synchronous services)

##### 3.1.2.1.1 BS 30 transparent in regular mode for analogue interworking

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fixed Network User Rate | Access Structure | Information Transfer Capability | Rate Adaptation | QoS attributes | UTRAN | GERAN Iu mode | GERAN A/Gb | Notes |
| 1.2 kbit/s | Synch | 3,1 kHz | - | T | - | - | Supported |  |
| 2.4 kbit/s | Synch | 3,1 kHz | - | T | - | - | Supported |  |
| 4.8 kbit/s | Synch | 3,1 kHz | - | T | - | - | Supported |  |
| 9.6 kbit/s | Synch | 3,1 kHz | - | T | - | - | Supported |  |
| 14.4 kbit/s | Synch | 3,1 kHz | - | T | - | - | Supported |  |
| 19.2 kbit/s | Synch | 3,1 kHz | - | T | - | - | Supported |  |
| 28.8 kbit/s | Synch | 3,1 kHz | - | T | Supported | Supported | Supported |  |

##### 3.1.2.1.2 BS 30 transparent in regular mode for digital interworking

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fixed Network User Rate | Access Structure | Information Transfer Capability | Rate Adaptation | QoS Attribute | UTRAN | GERAN Iu mode | GERAN A/Gb mode | Notes |
| 1.2 kbit/s | Synch | UDI | V.110 | T | - | - | Supported |  |
| 2.4 kbit/s | Synch | UDI | V.110 | T | - | - | Supported |  |
| 4.8 kbit/s | Synch | UDI | V.110 | T | - | - | Supported |  |
| 9.6 kbit/s | Synch | UDI | V.110 | T | - | - | Supported |  |
| 14.4 kbit/s | Synch | UDI | V.110 | T | - | - | Supported |  |
| 19.2 kbit/s | Synch | UDI | V.110 | T | - | - | Supported |  |
| 28.8 kbit/s | Synch | UDI | V.110 | T | - | - | Supported |  |
| 38.4 kbit/s | Synch | UDI | V.110 | T | - | - | Supported |  |
| 48 kbit/s | Synch | UDI | V.110 | T | - | - | Supported |  |
| 56 kbit/s | Synch | UDI | V.110 | T | Supported | Supported | Supported |  |
| 56 kbit/s | Synch | RDI | - | T | Supported | Supported | Supported |  |
| 64 kbit/s | Synch | UDI | - | T | Supported | Supported | Supported |  |

##### 3.1.2.1.3 BS 30 transparent for Multimedia

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fixed Network User Rate | Access Structure | Information Transfer Capability | Rate Adaptation | QoS Attribute | UTRAN | GERAN Iu mode | GERAN A/Gb mode | Notes |
| 28.8 kbit/s | Synch | 3.1kHz Audio | H.223 & H.245 | T | Supported | Supported | Supported |  |
| 32.0 kbit/s | Synch | UDI | H.223 & H.245 | T | Supported | Supported | Supported |  |
| 33.6 kbit/s | Synch | 3.1kHz Audio | H.223 & H.245 | T | Supported | Supported | Supported | Note 1 |
| 56 kbit/s | Synch | RDI | H.223 & H.245 | T | Supported | Supported | Supported |  |
| 64 kbit/s | Synch | UDI | H.223 & H.245 | T | Supported | Supported | Supported |  |

NOTE 1: 33.6kbit/s FNURs is applicable only for UTRAN.

Annex A (informative):  
Change history

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | | | | | |
| **TSG SA#** | **SA Doc.** | **SA1 Doc** | **Spec** | **CR** | **Rev** | **Rel** | **Cat** | **Subject/Comment** | **Old** | **New** | **WI** |
| Jun 1999 |  |  | 02.02 |  |  |  |  | Transferred to 3GPP SA1 | 8.0.0 | 3.0.0 |  |
| SP-05 | SP-99479 | S1-99608 | 22.002 | 001 |  | R99 | D | Editorial changes for alignment | 3.0.0 | 3.1.0 |  |
| SP-05 | SP-99446 | S1-99659 | 22.002 | 002 |  | R99 | B | Bearer Services | 3.0.0 | 3.1.0 |  |
| SP-06 | SP-99520 | S1-991008 | 22.002 | 003 |  | R99 | B | Addition of new general bearer service user data characteristics for 33.6kbit/s modem, FTM and multimedia calls | 3.1.0 | 3.2.0 |  |
| SP-06 | SP-99520 | S1-991075 | 22.002 | 004 |  | R99 | C | 22.002 made only applicable to CS Domain. | 3.1.0 | 3.2.0 |  |
| SP-07 | SP-000054 | S1-000132 | 22.002 | 005 |  | R99 | F | Corrections on 3,1 kHz Audio support | 3.2.0 | 3.3.0 |  |
| SP-08 | SP-000192 | S1-000274 | 22.002 | 006 |  | R99 | F | Lower User Rates in UMTS for Circuit Switched Data Services | 3.3.0 | 3.4.0 |  |
| SP-09 | SP-000371 | S1-000561 | 22.002 | 007 |  | R99 | F | 32 kbit/s UDI/RDI multimedia in GSM | 3.4.0 | 3.5.0 |  |
| SP-09 | SP-000390 | S1-000595 | 22.002 | 008 |  | R4 | C | Deletion of bearer service BS 30 NT | 3.4.0 | 4.0.0 |  |
| SP-11 | SP-010039 | S1-010253 | 22.002 | 010 |  | Rel-4 | C | CR to 22.002 clarification on Circuit Switched Bearer Services in UMTS | 4.0.0 | 4.1.0 | CS Bearers in UMTs |
| SP-11 | SP-010040 | S1-010254 | 22.002 | 011 |  | Rel-4 | D | Restructuring of 22.002 | 4.0.0 | 4.1.0 | CS Bearers in UMTs |
| SP-11 | SP-010040 | S1-010266 | 22.002 | 012 |  | Rel-4 | D | Restructuring of tables in section 3.1 | 4.0.0 | 4.1.0 | CS Bearers in UMTs |
| SP-12 | SP-010257 | S1-010357 | 22.002 | 013 |  | Rel-4 | F | Corrections to erroneous implementation of CRs SP-010039 and SP-010040 to 22.002. | 4.1.0 | 4.2.0 | TEI4 |
| SP-16 | SP-020244 | S1-021076 | 22.002 | 014 |  | Rel-5 | F | CR to 22.002 Correction of terminology and references | 4.2.0 | 5.0.0 | TEI5 |
| SP-26 | SP-040744 | S1-040997 | 22.002 |  |  | Rel-6 |  | Updated from Rel-5 to Rel-6 | 5.0.0 | 6.0.0 |  |
| SP-36 |  |  | 22.002 |  |  | Rel-7 |  | Updated from Rel-6 to Rel-7 | 6.0.0 | 7.0.0 |  |
| SP-42 | - | - |  |  |  | Rel-8 |  | Updated from Rel-7 to Rel-8 | 7.0.0 | 8.0.0 |  |
| 2009-12 | - | - | - | - | - | - | - | Update to Rel-9 version (MCC) | 8.0.0 | 9.0.0 |  |
| 2011-03 | - | - | - | - | - | - | - | Update to Rel-10 version (MCC) | 9.0.0 | 10.0.0 |  |
| 2012-09 | - | - | - | - | - | - | - | Update to Rel-11 version (MCC) | 10.0.0 | 11.0.0 |  |
| 2014-10 | - | - | - | - | - | - | - | Update to Rel-12 version (MCC) | 11.0.0 | 12.0.0 |  |
| 2015-12 |  |  |  |  |  |  |  | Update to Rel-13 version (MCC) | 12.0.0 | 13.0.0 |  |
| 2017-03 | - | - | - | - | - | - | - | Updated to Rel-14 by MCC | 13.0.0 | 14.0.0 |  |
| 2018-06 | - | - | - | - | - | - | - | Updated to Rel-15 by MCC | 14.0.0 | 15.0.0 |  |
| 2020-07 | - | - | - | - | - | - | - | Updated to Rel-16 by MCC | 15.0.0 | 16.0.0 |  |