**3GPP TSG- S4 Meeting #119-e *S4-220720***

**,**  **11-20 May 2022**

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| *CR-Form-v12.2* | | | | | | | | |
| **Pseudo CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **26.805** | **CR** |  | **rev** | **-** | **Current version:** | **1.2.0** |  |
|  | | | | | | | | |
| *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** |

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| ***Title:*** | [FS\_NPN4AVProd]: Solutions for KI#6 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Sennheiser | | | | | | | | | |
| ***Source to TSG:*** | S4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | FS\_NPN4AVProd | | | | |  | ***Date:*** | | | 10/05/2022 |
|  |  | | | |  | |  | | |  |
| ***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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
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| ***Reason for change:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | The Key issues #6 is extended with solutions | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

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

### 6.7.3 Solutions

#### 6.7.3.1 Solution 1: Interfacing circuit switching protocols

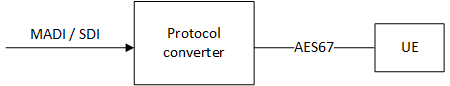
For circuit-switched audio transmission an adaptive function or protocol converter may be used to interface with the 5G System. This protocol converter is not part of the 5GS, but rather converts the audio in the circuit switching protocols like MADI [38] and SDI [35, 36] into a packet-based protocol like AES67 [40]. In professional audio, these types of devices are broadly available. In Figure 6.7.3.1‑1 the basic principle is shown.

Figure 6.7.3.1‑1: Interfacing circuit-switched audio with a 5GS

In the case of MADI, the protocol converter takes care of the active flags within the incoming stream and adapts the channel count and bit depth for generating the AES67 stream. Synchronisation is handled by the protocol converter and has several options:

- Clock recovery via MADI.

- External clock source via network (PTP [80]).

NOTE: The clock master selection is highly dependent on the actual deployment and audio network setup.

Supporting the need to clock the protocol converter within the 5GS, the UE may need to act as a PTP boundary clock (acting as master) towards the protocol converter (acting as slave).

In the case of SDI, the protocol converter may convert audio and video simultaneously, e.g. to ST-2110. Thus, the embedded audio in SDI would create the ST-2110-30 packet stream. This is essentially the same as AES67.

#### 6.7.3.2 Solution 2: Interfacing Ethernet-based protocols

The 5G System supports an “Ethernet” PDU Session. This session can be used to transport native Layer 2 Ethernet frames. Audio-over-Ethernet protocols often use their own EtherType (e.g. AVTP) as well as having their own payload definition.

The 5G System can be configured as a transparent bridge in a one-to-one relationship between the UE and the DNN behind the UPF. For more than one UE, the UPF needs to be aware of the UE’s MAC address(es) and routing information. (See clause 5.6.10.2 in [84] for more details.)

The timing requirements for each proprietary Ethernet-based audio protocol have to be met by the 5GS. Additonal QoS service for the Ethernet PDU session is needed.

#### 6.7.3.3 Solution 3: Interfacing IP-based protocols

Audio-over-IP protocols such as DANTE [82] and AES67 [40] can be natively supported by the 5G System. Applying the 5GS QoS framework and connecting the audio data network closely to the UPF may keep the latencies within workable limits.

Service discovery and connection management can be automated at the IP layer if the used Audio-over-IP solution provides such mechanisms. SDP-based service discovery may rely on support for IP multicast, but is not mandatory for successful operation.

Synchronisation between the devices and audio-related services may be guaranteed by utilizing the TSN framework of the 5G System [84], especially the support of PTP packet transportation [80] and boundary clock master support.

### 6.7.4 Summary

While legacy or circuit switching systems rely on a protocol converter commonly available from professional audio vendors, packet-based audio transport protocols can be interfaced directly to the 5G System.The 5G System needs to provide the necessary network Quality of Service for the audio transmission as well as appropriate synchronization support.

Configuration and resource management in a Non-Public Network context can be optimized for an audio network over 5G.

\*\*\*\* Last Change \*\*\*\*