**3GPP TSG-S4 Meeting #115e *S4-211167***

**, 18th August – 27th August 2021**

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| *CR-Form-v12.1* |
| **Pseudo CHANGE REQUEST** |
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|  | **26.805** | **CR** | **<CR#>** | **rev** | **<Rev#>** | **Current version:** | **<Version#>** |  |
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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 |  | Radio Access Network |  | Core Network |  |

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| ***Title:***  | [FS\_NPN5AVProd] Proposal of a new NPN usage related Key Issue |
|  |  |
| ***Source to WG:*** | Ericsson LM, BBC, EBU, Sennheiser, Dolby |
| ***Source to TSG:*** | S4 |
|  |  |
| ***Work item code:*** | FS\_NPN4AVProd |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** |  |  | ***Release:*** |  |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories 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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
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| ***Reason for change:*** | The current version of the technical report only contains some few potential key issues. The intention of this contribution is to extend the list of potential key issues with an NPN usage related key issues, which should be studied in more detail. |
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| ***Summary of change:*** | A new potential key issue is proposed, focusing on using different NPNs. |
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| ***Consequences if not approved:*** |  |
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| ***Clauses affected:*** |  |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  |  |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  |  |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  |  |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

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

#### 5.2.5.9 Key Issue #8: Usage of NPN (SNPN or PNI-NPN)

Editor’s Note: SA2 is studying NPN evolutions and results are documented in TR 23.700-07. It is unclear whether additional considerations are needed, e.g. to integrate the NPN and the NPN devices into a Media Production network (e.g. NMOS authorization, etc.).

Starting in Release 16, 3GPP defines the concept of a Non-Public Networks (NPN) to refer to a 5G System (5GS) deployed for private use (e.g. a business-to-business network deployment) and designed to support requirements and services for such scenarios. This may be done by deploying specific features involving physical and/or virtual infrastructure and network services.

The requirements to enable NPNs for video, imaging and audio for professional applications are described in 3GPP TS 22.261 under the following clauses:

- Generic NPN requirements can be found in clause 6.25.

- Requirements on the subscription aspects can be found in clause 6.14.

- Authentication requirements can be found in clause 8.3.

3GPP is addressing such requirements and capabilities for the support of NPNs under different work items involving functional (SA2) and management (SA5) aspects.

3GPP classifies NPNs into two principal categories:

**-** *Standalone NPN (SNPN)* is an NPN whose deployment neither relies on network functions nor on network services provided by a PLMN. The SNPN is operated by an NPN operator which could be the media company itself or a contracted third party. The NPN operator has the capabilities to manage and control the network functions provided by the SNPN.

On the network side, the SNPN is identified by combination of a PLMN ID and Network identifier (NID). At the UE, these two parameters need to be configured to access the SNPN. The PLMN ID may be one assigned in the range of PLMN IDs for private networks (e.g. based on MCC 999, as assigned by the ITU). The PLMN ID of a PLMN that is operating the SNPN may also be reused. The NID could be self-assigned by an individual SNPN or assigned in coordination with other NPN operators.

Note that a UE connected to an SNPN may also be able to access services from a PLMN. In such case, the UE is required to register with both networks. Release 16 specifications do not include support for roaming, handover between SNPNs not interworking with Evolved Packet Core (EPC). Emergency services are not supported in SNPNs.

Editor’s Note: What if the NPN operator uses DNNs or Network Slicing (i.e. PNI-NPN technologies) to offer network services to media producers?

**-** *Public Network Integrated NPN (PNI-NPN)* is an NPN deployed with the support of at least one PLMN. This model may involve a contract between the the NPN user (e.g. media company) and the PLMN providing the network resources (including radio access and core network) to support the media company requirements. Two deployment solutions are normative:

- *PNI-NPN deployment by means of dedicated Data Network Names (DNNs).* The DNN defines a dedicated gateway (UPF) in the PLMN to/from which NPN traffic is conveyed and dispatched to the NPN local area network.

*- PNI-NPN deployment by means of network slicing.* The PLMN provisions a dedicated slice of the PLMN comprising a set of resources allocated for the exclusive use of the NPN. Such a network slice may define specific network functions or features to be used for the NPN including, for instance, UE onboarding and authentication, Time Sensitive Networking (TSN) [39] integration, etc.

For both of these deployment models, the PLMN ID is used to access the PNI-NPN. Therefore, UEs must already have a subscription to a PLMN. In order to control the service area of the NPN, a list of subscribers who are allowed ~~to~~ access the cells associated with the PNI-NPN can optionally be provided by means of a Closed Access Group (CAG). When PNI-NPN is provisioned by network slicing, a UE may be preconfigured with Single Network Slice Selection Assistance Information (S-NSSAI) to access certain slices.

The NPN architecture defined in Release 16 has been further enhanced, including for instance:

- Enable support for SNPN along with subscription/credentials owned by an entity separate from the SNPN operator.

- Support UE onboarding and provisioning for NPNs.

- Support audio–visual content production service requirements, e.g. for service continuity

- Support voice/IMS emergency services for SNPN.

Depending on the considered application, the NPN can also be enriched with other complementary functionalities, including Wi-Fi access and TSN technologies.

\*\*\*\* Next Change \*\*\*\*

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 22.261: "Service requirements for the 5G system".

[3] 3GPP TS 22.263: "Service requirements for Video, Imaging and Audio for Professional Applications (VIAPA)".

[4] 3GPP TS 22.827: "Study on Audio-Visual Service Production".

[5] M.P. Sharabayko, M.A. Sharabayko, J. Dube, JS. Kim, JW. Kim: "The SRT Protocol", draft-sharabayko-mops-srt-01

[6] VSF: "Reliable Internet Stream Transport (RIST) Activity Group", https://www.videoservicesforum.org/RIST.shtml

[7] VSF TR 06-1: "Reliable Internet Stream Transport (RIST) Protocol Specification – Simple Profile", <https://vsf.tv/download/technical_recommendations/VSF_TR-06-1_2018_10_17.pdf>

[8] VSF TR 06-2, "Reliable Internet Stream Transport (RIST) Protocol Specification – Main Profile", [https://www.vsf.tv/download/technical\_recommendations/VSF\_TR-06-2\_2020\_03\_24.pdf](https://protect2.fireeye.com/v1/url?k=cc406e56-93db577d-cc402ecd-866038973a15-a3187c63f11b10f6&q=1&e=1f3c54ba-abd4-4509-b7b2-0816901e7741&u=https%3A%2F%2Fwww.vsf.tv%2Fdownload%2Ftechnical_recommendations%2FVSF_TR-06-2_2020_03_24.pdf)

[9] NewTek: "NDI Encoding/Decoding", <https://support.newtek.com/hc/en-us/articles/218109667-NDI-Encoding-Decoding>

[10] NewTek: "NDI Network Bandwidth, <https://support.newtek.com/hc/en-us/articles/217662708-NDI-Network-Bandwidth>

[11] David Aleksandersen: "What is NDI® (Network Device Interface)?", <https://newsandviews.dataton.com/what-is-ndi-network-device-interface>

[12] Kieran Kunhya and Ciro Noronha: "RIST and SRT: What’s the difference?", <https://www.tvbeurope.com/ip-migration/rist-and-srt-whats-the-difference>

[13] Tofik Sonono: "Interoperable Retransmission Protocols with Low Latency and Constrained Delay: A Performance Evaluation of RIST and SRT", Masters Thesis, KTH Stockholm, 2019, http://kth.diva-portal.org/smash/get/diva2:1335907/FULLTEXT01.pdf

[14] EBU: "Minimum User Requirements to Build and Manage an IP-Based Media Facility", 15 July 2020, <https://tech.ebu.ch/files/live/sites/tech/files/shared/tech/tech3371.pdf>.

[15] AMWA: "NMOS Overview", <https://www.amwa.tv/nmos-overview>.

[16] EBU: "The Technology Pyramid For Media Nodes", https://tech.ebu.ch/publications/technology\_pyramid\_for\_media\_nodes.

[17] EBU: "Technology Pyramid Media Node Maturity Checklist", September 2021, <https://tech.ebu.ch/publications/technology-pyramid-media-node-maturity-checklist?rec=1>.

[18] AMWA: "NMOS Technical Overview", <https://specs.amwa.tv/nmos/branches/main/docs/2.0._Technical_Overview.html>.

[19] AMWA: "Networked Media Systems – the Big Picture",
<https://static.amwa.tv/networked-media-systems-big-picture-2021-03-05.pdf>.

[20] AMWA: "NMOS specification repository", <https://specs.amwa.tv/nmos>.

[21] SMPTE ST 2110: "Professional Media over Managed IP".

[22] IEEE 1588-2008: "Precision Time Protocol".

[23] SMPTE ST 2022-1:2007: "Forward Error Correction for Real-Time Video/Audio Transport Over IP Networks".

[24] SMPTE ST 2022-6:2012: "Transport of High Bit Rate Media Signals over IP Networks (HBRMT)",

[25] SMPTE ST 2022-7:2019: "Seamless Protection Switching of RTP Datagrams".

[26] SMPTE ST 2059-2:2015: "SMPTE Profile for Use of IEEE-1588 Precision Time Protocol in Professional Broadcast Applications".

[27] SMPTE ST 2110-10:2017: "Professional Media Over Managed IP Networks: System Timing and Definitions".

[28] SMPTE ST 2110-20:2017: "Professional Media Over Managed IP Networks: Uncompressed Active Video".

[29] SMPTE ST 2110-22:2019: "Professional Media Over Managed IP Networks: Constant Bit-Rate Compressed Video".

[30] SMPTE ST 2110-30:2017: "Professional Media Over Managed IP Networks: PCM Digital Audio".

[31] SMPTE ST 2110-31:2018: "Professional Media Over Managed IP Networks: AES3 Transparent Transport".

[32] IETF RFC 4585: "Extended RTP Profile for Real-time Transport Control Protocol (RTCP)-Based Feedback (RTP/AVPF)".

[33] IETF RFC 8086: "GRE-in-UDP Encapsulation".

[34] Ember+ control protocol, https://github.com/Lawo/ember-plus

[35] SMPTE ST 259:2008: "For Television — SDTV Digital Signal/Data — Serial Digital Interface".

[36] SMPTE ST 292-1:2012: "1.5 Gb/s Signal/Data Serial Interface".

[37] 3GPP TR 26.925: "Typical traffic characteristics of media services on 3GPP networks".

[38] Wikipedia, 2021, MADI, last modified 19th April 2021, <https://en.wikipedia.org/wiki/MADI>

[39] Wikipedia, 2021, Time-Sensitive Networking, last modified 23rd June 2021, <https://en.wikipedia.org/wiki/Time-Sensitive_Networking>

[40] AES67 / SMPTE ST 2110: "COMMONALITIES AND CONSTRAINTS", <https://aimsalliance.org/wp-content/uploads/2019/04/AES67-SMPTE-ST-2110-Commonalities-and-Constraints-Updated-April-2019.pdf>

[41] IETF RFC 5104: "Codec Control Messages in the RTP Audio-Visual Profile with Feedback (AVPF) ".

[42] IETF RFC 4585: "Extended RTP Profile for Real-time Transport Control Protocol (RTCP)-Based Feedback (RTP/AVPF) ".

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