5G NPNs for media production in collaboration with third-party networks

While Non-Public Networks (NPNs) can be self-operated in isolation (see our SNPN Explainer), they can also be operated in collaboration with third-party networks. The different configuration options and degrees of integration can accommodate a variety of technical, commercial and regulatory models.

What are the deployment options?

Different elements of the overall 5G system can be deployed in collaboration with third-party networks, including public networks. Two of the most relevant options are sharing network infrastructure and integrating an NPN within a public network, the latter defined in the 3GPP Release 16 specifications.

Network sharing

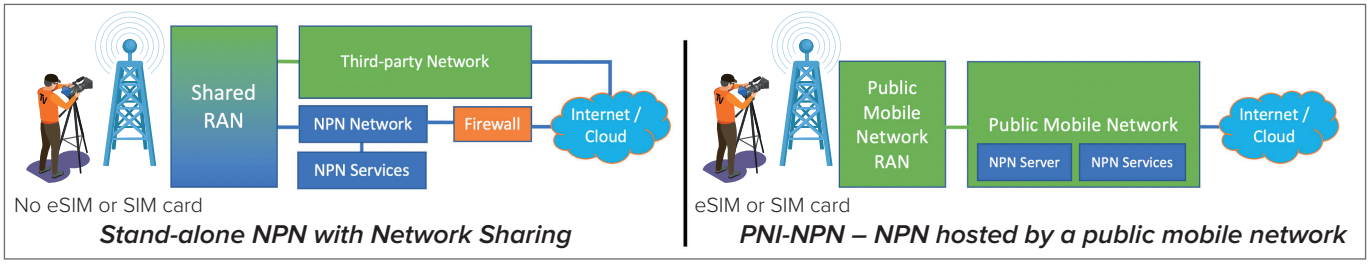
Here the NPN is deployed using a combination of infrastructure owned by an NPN operator and part of the infrastructure of a third-party network, either public or private. Options may include sharing masts, sites and/or the RAN (radio access network). This allows multiple NPN operators to share the resources of a single network according to service level agreements. In particular, network sharing models may enable a 'neutral host' role, where media companies could access infrastructure on an ad-hoc basis (e.g., in stadiums and venues for given events).

This scenario is based on features specified for stand-alone NPNs, whereby each NPN is uniquely identified by a code consisting of an ITU-defined network operator identifier, intended for private use, and a regionally allocated network identifier. This allows equipment (e.g., cameras, microphones, etc.) to be connected to the network without the need for an eSIM or SIM card. Instead, the equipment is configured with credentials specific to the NPN in question.

Public Network Integrated NPN (PNI-NPN)

In this case, a public mobile network provides the network services and functionalities required to operate an NPN. This can be done either using a dedicated Data Network Name (DNN)[1] or via one or more network slice[2] instances allocated for the NPN. In this setup, devices need to have an eSIM or SIM card and a subscription with a mobile network operator to access the PNI-NPN. In addition, 3GPP defines mechanisms to authorize specific equipment and users.

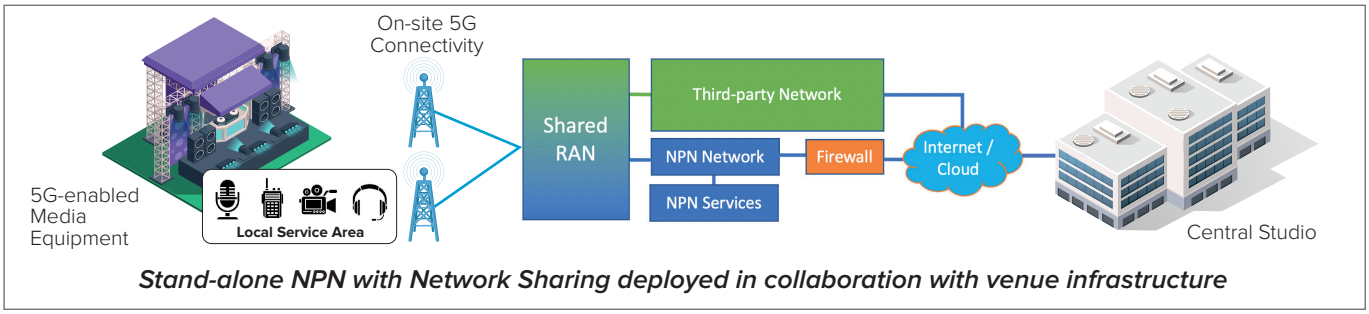
PNI-NPN models offer flexibility to deploy, configure and customize the 5G system for private use, leveraging the capabilities of the public network such as its coverage area, backhauling capacity, provisioning of edge cloud resources, etc. Successful deployment depends on the ability of the public network to meet the requirements for media applications. This involves guaranteeing adequate quality of service (QoS) or enabling the isolation and security of the production equipment and media data and control flows in the network, among others. The commercial agreements between the stakeholders involved are also key.



[1] A DNN (Data Network Name) is equivalent to an APN (Access Point Name) defined in 4G. The DNN identifies a gateway in the public network from/to which NPN traffic is routed.
[2] Network slicing enables the creation of a set of so-called logical networks on top of shared infrastructure. Each of these logical networks, consisting of network resources and functions, can be tailored to meet specific requirements.

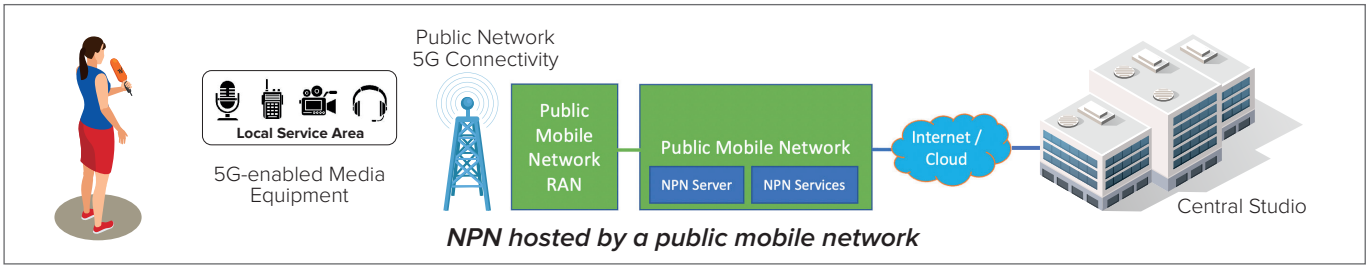
Applications for the media industry

On-site production and venues with 5G connectivity
Media producers may leverage 5G connectivity from third-party networks where available, in particular at venues or for outdoor events. A key feature for such deployments would be the ability to effectively isolate media flows from other traffic in the network. This may be challenging to achieve at the radio layer as simultaneous demand of radio resources is expected during live events, generated from both public and private data traffic.



Stand-alone NPN with Network Sharing deployed in collaboration with venue infrastructure

Special events coverage and breaking news reporting
Coverage of special events may be handled with professional equipment connected directly to the public 5G network. The application of PNI-NPN functionalities such as the setup of local area networks or the prioritization of traffic by means of network slicing may provide additional advantages. For newsgathering, media organizations are increasingly relying on mobile networks for live contribution with professional cameras equipped with 5G uplink streaming modems. PNI-NPN functionalities may allow the 5G network to fulfill certain QoS requirements, therefore evolving beyond the current “best-effort” cellular bonding.



NPN hosted by a public mobile network

User-generated content and live production with audience involvement
When interconnecting a public network with a non-public one, different possibilities for audience engagement or augmented experiences at venues may be possible, while guaranteeing that devices on the public network and the NPN are authenticated independently in their respective networks.

5G-MAG and Non-Public Networks for Media Production

5G-MAG members are studying different ways of using 5G for media production and contribution scenarios. By ensuring the standards are capable of being configured according to differing needs, media organizations are provided with a wide range of possibilities from which to choose depending on the commercial, business and regulatory context.

Useful Links

- 3GPP TR 22.827 v17.1.0 “Study on Audio-Visual Service Production“
- 3GPP TS 23.501 v16.7.0 “System architecture for the 5G System (5GS)”
- GMSA report on “Mobile Infrastructure Sharing”

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