ROHDE&SCHWARZ
Make ideas real

TRAI Consultation Paper

Regulating Converged Digital Technologies and Services – Enabling Convergence of Carriage of Broadcasting and Telecommunication services

- Rohde & Schwarz Response

Rohde & Schwarz GmbH & Co. KG
P.O. Box 80 14 69 | 81614 Munich

Dr. P.D. Vaghela
Chairman
Telecom Regulatory Authority of India
Government of India
New Delhi, India

Contact
Mohan Kakde
Phone +91 11 4253 54-25
Fax
Mohan.kakde@
rohde-schwarz.com

Jayanth Ramachandran
Phone +91 8041780400-405
Jayanth.ramachandran@rohde-schwarz.com

Mohamed Aziz Taga
Phone +49 89 4129 13072
Aziz.Taga@rohde-schwarz.com

Munich, March 24, 2023

Subject: Response to TRAI's Consultation Paper on "Regulating Converged Digital Technologies and Services – Enabling Convergence of Carriage of Broadcasting and Telecommunication services"

Dear Dr Vaghela,

This is with reference to the TRAI consultation paper on Regulating Converged Digital Technologies and Services – Enabling Convergence of Carriage of Broadcasting and Telecommunication services, released on Jan 30, 2023.

In our submission, we have provided you with adequate and relevant information to facilitate your consultation on this important topic. Our endeavor has been one of technology providers, offering an approach for the expansion of the ecosystem in India along with global market best practices as well as regulations and universal recommendations, to expedite such transformation. The responses have been drafted keeping in view the status of the technology, indicative trends of its evolution, the ecosystem availability and of viable business models.

We shall be more than happy to provide further inputs on these or any other aspects of use for broadcast-broadband convergence.

Sincerely,

Mohamed Aziz Taga

Head Product, Business Development & Strategy

Rohde & Schwarz GmbH Co. & KG

Q1. Whether the present laws are adequate to deal with convergence of carriage of broadcasting services and telecommunication services? If yes, please explain how?

OR

Whether the existing laws need to be amended to bring in synergies amongst different acts to deal with convergence of carriage of broadcasting services and telecommunication services? If yes, please explain with reasons and what amendments are required?

OR

Whether there is a need for having a comprehensive/converged legal framework (separate Comprehensive Code) to deal with convergence of carriage of broadcasting services and telecommunication services? If yes, provide details of the suggested comprehensive code.

AND

Q2. Whether the present regime of separate licenses and distinct administrative establishments under different ministries for processing and taking decisions on licensing issues, are able to adequately handle convergence of carriage of broadcasting services and telecommunication services?

If yes, please explain how?

If no, what should be the suggested alternative licensing and administrative framework/architecture/establishment that facilitates the orderly growth of telecom and broadcasting sectors while handling challenges being posed by convergence? Please provide details.

Today's consumer behavior has dramatically changed the way how content may be delivered. Years back, TV at home was the main source of entertainment when all the family members awaited national and international programs with impatience. Nowadays, the interest in traditional linear TV has shifted towards IP-based streaming services where new players like exclusive content provider/owners are gaining more and more audience. Hence, the founders of the traditional linear TV concept e.g., Public and Private Broadcasters are shifting themselves to IP-based services while keeping their existing traditional broadcasting system running in parallel, in many cases.

Since IP-based streaming services e.g., IPTV are actually multi-screen-oriented platforms, end users have then the total freedom to consume the content they prefer on the device of their choice, at home and/or on-the-go. According to Statista, more than 1.2 billion smartphones were sold around the world just in 2022. Moreover, the number of global smartphone users is estimated at 6.8 billion, marking around 5% annual increase year-over-year. India alone has more than 650 million smartphone users, with a refresh rate of about 3.5 years, which clearly highlight the importance those mobile devices are playing in India citizens' daily lives.

Based on that, streaming of live, linear and on-demand content became the main aim of using smartphones while being connected to various networks which are not optimized to deliver multi-service platforms and satisfy the consumer needs. Hence, the need to focus on converging of broadcasting and telecommunication across several levels such as Infrastructure, spectrum, and service offerings to deliver to consumers the best-in-class Quality of Service and provide unparalleled mobile experience allowing them to stay longer in the network.

In fact, a converged system creates more value than the sum of earlier individual units. So, instead of having vertically separate networks for each service with separate spectrum, the digital platforms and networks may have horizontal layers or the convergence can simply take place on the end use device e.g. smartphone or TV set without the need of increasing hurdles on the stakeholders or the proponents aiming at providing converged services and enhancing consumer experiences.

Moreover, a well-regulated convergence between broadcast and telecom worlds will empower an efficient utilization of the frequency resources (470 – 582 MHz), an increased level of energy efficiency, an enhanced level of

competition, more innovative user applications and lower entrance barriers, especially with the right incentives towards new business opportunities to enable quicker market response.

In addition, setting-up a clear, transparent and easy mechanism for the convergence between broadcast and broadband worlds will enable a wider variety of services for the end users ranging from Free-To-Air (FTA) to Pay-per-use service offerings while lowering CAPEX and OPEX. Telecom Service Providers (TSP) and broadcasters like Prasar Bharathi (PB) in India are actively working to meet changing user needs, make effective use of business resources, and exploit synergies among various business activities by developing activities that transcend the barriers between telecommunications and broadcasting.

The recent increase in OTT media consumption is continuously challenging telecom service providers (TSPs) to support more content, more devices, and more users within the limited infrastructure resources. The existing unicast delivery methods would require a significantly large investment without justifiable Return on Investments (ROI). That is why a clearly regulated path towards converging of telecom and broadcast services will certainly facilitate the efficient utilization of the underlying infrastructure and frequency resources. It will as well ensure that the carriage of these services will prove that they increasingly complement each other vis-a-vis the growing consumer demands towards the same content experience and other broadcasting/telecommunication services across multiple device form-factors.

In this regard it is recommended that TRAI – as the common regulator – review the challenges holistically and frame the business rules in consultation of the respective ministries (DoT and MIB) and their associated engineering bodies (TEC and BECIL) through the respective ministries. In order to avoid inconsistencies in the development of the policy approach and even increase the regulatory burden and cost on the business and Industry, it is recommended to focus on the Ease of Doing Business (EoDB) as the Industry is not clear as to who will prepare policies, give permissions and who will decide the regulatory framework. Unless that is clear, an ambiguous regulatory environment will negatively impact the investment sentiment and will loosen innovation as the response time to exploit new technologies increases.

To ensure that the citizens benefit from this convergence and to maximize on the revenue to the exchequer. R&S recommends the following:

- **Option 1:** In case the convergence between Broadcast and Telecoms is interpreted as “connection-oriented” Telco-Broadcast service where the services can only be granted to the consumer by a network connection and a subscription like IPTV services, then the IPTV service licensing shall apply
- **Option 2:** In case the convergence between Broadcast and Telecoms is interpreted as “connectionless” Telco-Broadcast service where the services may be granted without a necessity of a network connection and a subscription like FM or DTH services, then either FM and/or DTH licensing shall apply

The regulatory regime has to be such that the consumers, service providers and content owners/providers should benefit from technological advances. The regime should be inspired from existing practices and policies be easy to be adopted without creating any hindrance in the deployment of any technology for offering any type of new services. Having a fully converged regulator would help in increasing the confidence of the international investors and facilitate faster rollout of the digital services in the country.

With regards to the previously described options, below licensing regime details maybe taken into consideration:

- **Option 1 – Hybrid Licensing regime**

    1. DoT to manage and issue licensing in accordance with MIB access regulations
    2. MIB to regulate the broadcast content type, rights as well as terms and conditions
    3. TRAI to define QoS/QoE and setup licensing norms for Broadcast – Telecom Convergence.

In this case, broadcasting services through IPTV shall be provided by the so-called Multi- System Operators (MSOs), as neutral hosts. The license to operate as MSO to be given by the respective ministries i.e. Ministry of Information and Broadcasting (MIB) and Department of Telecommunications (DoT). However, as per their guidelines all Multi-system Operators before providing IPTV-like services are required to submit a self-certified declaration to MIB, DoT and TRAI giving details such as license/ registration under which IPTV service is proposed, the start date, the area being covered, and details of the network infrastructure etc.

For the content regulation, the licensees shall follow the prevailing Acts/Rules/Guidelines of the MIB in respect of content carried on IPTV.

Thus, the broadcast access network is regulated/licensed by DoT under Indian Telegraph Act, 1885 and the content part is regulated by MIB under the Cable Television Network (Regulation) Act 1995 and Rules made there under and other guidelines issued by MIB from time to time.

Although, under the scope of Access Service Authorization and Internet Service Authorization, the licensee is permitted to provide IPTV service, which is a broadcasting service. This is the only broadcasting service that is dealt under the telecom license regime i.e. DoT.

In this case, licenses for telecom and broadcasting continue to remain somehow separate as per existing statutory framework but are managed/administered by a single ministry i.e. MIB by amending Business Allocation Rules.

- **Option 2 – Converged Licensing regime**

    1. MIB to manage licensing, issue permissions and allow access regulations with the support of WPC under DoT monitoring
    2. MIB to regulate the broadcast content type, rights as well as terms and conditions
    3. TRAI to define QoS/QoE and setup licensing norms for Broadcast – Telecom Convergence.

This converged licensing regime will be similar to FM Radio where licensing process is transparently administered through auctions. For operating the broadcast-broadband converged stations, the eligible entity has to take part in the auction process for the frequency channels (470 – 582 MHz) conducted by MIB. Similar to FM Radio Stations where only successful bidders in the auction are granted permission by MIB subject to fulfillment of terms and conditions.

Using such regime, licenses/permissions for broadcasting can be made as authorizations under converged license, if the same is permitted through a modified converged Act. Convergence at licensing level can be described as the system of providing a single license/permission with authorizations for different communication services/communication service providers. Such authorization can be provided by the ministry or department which oversees provision of the communication service or infrastructure network. And since FM/DTH auctioning modelling is very successful, hence under the converged licensing regime, the carriage policy and regulations for broadcasting should continue with MIB.

It is important to bring in various procedural adjustments as part of implementing the Ease of Doing Business (EoDB) where close coordination among various administrative ministries can alternatively be achieved through use of ICT tools like developing a digital portal that handles issues in granting of licenses and permissions including compliances etc., across involved ministries.

In addition, regulation of content requires separate skill sets of creative and artistic persons than that of technocrats or economists who can factor the impact of content on sensibilities, morals, and the value system of the society. Hence, content policy and regulation should also continue with the MIB while assuring the alignment at the national (DoT) and international levels (ITU).

To conclude, whichever option will be chosen, Rohde & Schwarz recommends a very close collaboration with the main ministries i.e. MIB and DoT in order to reach best synergies possible through a well-designed scheme of regulation that helps convergence of broadcast and broadband networks vastly increase competitiveness and hence the efficiency of the economy.

Q3. How various institutional establishment dealing with –

(a) Standardization, testing and certification.

(b) Training and Skilling.

(c) Research & Development; and

(d) Promotion of industries

under different ministries can be synergized effectively to serve in the converged era. Please provide institution wise details along with justification.

Today, the TEC is the main Standards Setting Organization (SSO) in India that has expertise in the development of local standards for access technologies, including its testing and certification. The MIB together with its PSU, BECIL, as well, DoT via its PSU TCIL offer training and turnkey solutions for the related ministries. The DoT carries research through the NTIPRIT and C-DoT. Unfortunately, these organizations do not have in their mandate to address matters related to convergence and therefore are unlikely to create synergy in a timeline that is within the sweet spot for the subject of broadcast broadband convergence.

It is also noted that the field of broadcast broadband convergence has seen a wealth of innovation in the past, and specialized standards development bodies like the 3GPP have developed converged standards that are general purpose like in addressing the needs of such convergence. It is worth noting that the corresponding standards from 3GPP have also been adopted by the TEC into National Standards which will ensure that every network and device in the Indian market will start supporting such convergence, benefiting citizens and state alike.

TEC is also in the process of developing Generic Requirements (GRs) targeting the testing and certification needs of products based on these standards. These 3GPP standards continue to evolve through the participation of Indian stakeholders. There are also companies within India with expertise (like the ones in the VoICE[1] platform), who are now skilled and developing products based on 3GPP, thereby allowing Indian companies also to enter outside markets.

[1] VoICE: Voice of Indian Comtech Enterprises (https://www.voiceofindiancomm.com)

Q4. What steps are required to be taken for establishing a unified policy framework and spectrum management regime for the carriage of broadcasting services and telecommunication services? Kindly provide details with justification.

India is one of the biggest markets in the world – if not the bigger – consuming open market devices. The ability to broadcast to the tens of millions of mobile devices from the open market will eventually define the success of this convergence. The converged broadband broadcast network therefore needs to integrate seamlessly into the mobile operator network for it to succeed via the implementation of TEC national standards. The rapid adoption of this technology will define its utility value, which further defines the value of the spectrum it would be occupying.

It is worth noting that the spectrum in the UHF range is already identified as a converged band in India for 5G and Broadcasting[2]. The spectrum allocated for broadcast in India is in the 470-582 MHz range (14 channels of 8 MHz), which is well below the broadcast spectrum employed in the rest of the world (470-694/698 MHz). There is a considerable opportunity for India to continue on this lead and develop the ecosystem of devices in this band, for both domestic consumption and export.

To further ensure that the convergence becomes a reality, it is recommended that third party players are allowed to participate in the offering of converged services via one of the options previously highlighted by R&S, via auctioning the existing broadcasting infrastructure and frequency resources (or at least a majority of the 14 channels available) for public-private innovation to drive the utility value of the underlying spectrum.

While looking into the UHF band in India, MIB shall explore, together with DoT, the possibility of this band to be used for a converged broadcast-broadband network where, as per 3GPP Rel-18 (being currently defined), the UHF band is of a new type – named SDO (Supplementary Downlink Only) – may operate in parallel with an existing FDD and/or TDD bands of a Mobile Network Operator. It is therefore necessary that the new broadcast-broadband regulations allow MNOs to also offer interactive broadcast and multicast services.

[2] Refer to Annex 1.1 (DoT Reference Letter dated 13th September 2021 regarding the availability of spectrum for 5G/IMT) of TRAI consultation paper number 8/2021 dated 30 Nov 2021 on Auction of Spectrum in Frequency Bands identified for IMT/5G.

Q5. Beyond restructuring of legal, licensing, and regulatory frameworks of carriage of broadcasting services and telecommunication services, whether other issues also need to be addressed for reaping the benefits of convergence holistically? What other issues would need addressing? Please provide full details with suggested changes, if any.

Once a new policy and licensing framework of carriage of broadcasting and broadband services is chosen for India, it is important to look into market options while being totally agnostic, vis-à-vis the technologies to be deployed in India. At the end, a new convergence framework can only concretize with the right choice of the underlying technological options available in the wide market. As a technology-agnostic leader, R&S has been always committed to provide continuous support to its partners across the globe, and that is why we are supporting multiple broadcasting technologies based on regional market needs including DVB-T/T2, DTMB, ISDB-T and ATSC.

R&S has been closely monitoring the introduction of a new technological definition in India, Direct-to-Mobile (D2M). As a concept, R&S believes that it complements the Direct-to-Home (DTH) concept in the Indian market and hence supports the new nomenclature, underlying a technology-agnostic approach.

The march of technology continues to move at a faster pace and therefore the definitions of services need to be technology agnostic and also all encompassing. Since the new convergence framework will require adequate technological implementation, R&S believes that the latter should be transparently chosen and clearly defined by the Market Players, where no technology-specific recommendation needs to be elaborated.

From a broadcast market point of view, DVB-T2 is a very mature technology in the EMEA and Columbia, which has been primarily designed for fixed reception, mainly using roof-top antennas. It is now commercially available in multiple countries with strong performances. The same technology has also been tried in a mobile reception mode but never took off, even with its DVB-T2 Lite version. Even though, its underlying physical layer can be accommodated to enter the mobile environment, the ecosystem could not digest adding an external hardware dongle to selected smartphones, just to watch TV services. This reminds us of the DVB-H and MediaFlo era, where efficient technologies were especially created for mobile environments - but never took off, despite significant investments made into the development by the broadcasting industry.

While connecting the DVB-H/MediaFlo cases with DVB-T/T2, the main learning is that ***the success of a technology is not necessarily linked to its perfect performance, but rather to the readiness of the overall ecosystem*** to relay support to its E2E implementation, so that multiple use cases can become a reality.

Rohde & Schwarz was among the first stakeholders in the industry to support ATSC1.0 in the US market, and heavily contributed to the development and deployment of ATSC3.0 in South Korea since 2015 and in the US since 2016. Recently, Jamaica has also considered ATSC3.0 as their future DTT technology. R&S clearly considers ATSC3.0 as one of the powerful and promising technologies equipped with a high-end physical layer to primarily address higher Home TV experiences. But similar to DVB-T/T2, ATSC3.0 targets support into mobile devices through an additional silicon either added inside the devices or directly connected to mobile devices (dongles) in order to accommodate a non-3GPP support in the existing and future planned smartphones generations. While using the same concept, DTMB-A and Advanced ISDB-T are also aiming at supporting mobile reception.

While it seems to be crucial that for a certain broadcast technology to see the light under a well-established mobile ecosystem like 3GPP, eMBMS an IMT-based broadcast/multicast solution designed with LTE did not generate the expected economical results. The main reasons behind its failure were a mixture of a technical complexity where convergence was not naturally met alongside the absence of a concrete business case. The latter was attributed to the non-justifiable usage of pricy MNO spectrum for broadcast further resulting in the congesting the network. Therefore, it is essential that spectrum is used efficiently, so that equitable access could be available to different users for operation of radio communication networks in an interference free environment.

It is therefore imperative that we discuss the topic of convergence holistically and confirm the availability of broadcast support on end the user device ecosystem, alongside any discussion on the technology choice to be made. Incrementally, we could conclude that a broadcast technology inspired from the mobile ecosystem is certainly a pre-requisite but not sufficient for its success. The latter should have also lower complexity in order to facilitate its implementation, with a totally different consumer behavior where barrier-free access, interactivity (combined broadcast and broadband) and seamless service continuity (switch between broadcast and broadband) are defining the main headline for new service offerings.

The success of broadband streaming has shown that user-interactivity is an essential value for modern media and entertainment industries as consumers these days prefer to be an active participant rather than remaining as a passive recipient. The media broadcasting, in the new convergence era, will find its momentum from interactivities among various platforms and systems. Based on those interactions, the broadcast Digital Terrestrial Television (DTT) is expected to be able to identify itself through real-time programs enriched in broad dimensions, enhanced qualities of experience and service. Besides, the Quality of Service (QoS) and Quality of Experience (QoE) are now important metrics indicating the level of satisfaction of the consumers.

Globally, the broadcasting industry has been always seeking new ways for business diversification since the traditional TV impact has been losing its light. Based on that, a new terrestrial broadcast technology named LTE-Based 5G Terrestrial Broadcast (aka, 5G Broadcast) appeared in the industry specification since 2017 ***for operation in the UHF spectrum***. Since 2019, many European countries, China, Brazil and several others have started to shift their focus into 5G Broadcast as their next terrestrial broadcast standard. Since 5G Broadcast is merging both terrestrial broadcast and mobile applications together under the same specifications, the support of such feature in some of the existing and upcoming smartphones and tablet models is just a matter of software and middleware adjustment and upgrades. In other terms, there will be no need for additional silicon or any hardware changes within the same mobile devices or even vehicles.

This technology has been inspired from the telecommunication world via 3GPP under the lead of the European Broadcast Union (EBU) and has been endorsed as a standalone terrestrial broadcast system in Europe via the ETSI standard (ETSI TS103 720) labeling the capability of mobile reception in multiple European countries. On top, Study Group 6 (SG6) within ITU-R recently endorsed 5G Broadcast as worldwide DTT standard within UHF band, labeled as “System-L” in order to facilitate local and regional future DTT regulations.

For the India case, R&S considers that Direct-to-Mobile (D2M) is a perfect framework where any of the above-mentioned technologies or combinations thereof could fit. We would recommend that the TEC and BECIL together explore the possibilities in identifying the technology of choice for India. They can consider the global interests around the technologies, devices ecosystem and viable business models in their study.

Furthermore, we believe that there are two types of broadcast markets - Green Field and Brown Field that are clearly distinguishable. A Green Field market is where analogue broadcast technologies are still dominant or where digital broadcast services exist with a very low penetration ratio e.g. <10%. Whereas, a Brown Field is a market where digital broadcast services exist with dominant population penetration ratio e.g. >10%. It is also a fixed-reception-oriented market where roof-top/fixed home TV services are primarily considered.

Green Fields are much more open to new broadcasting technologies where roll-outs can happen quickly, including its interactivity with broadband and converged services, since the main targeted frequencies are available and mobile is of a higher importance than TV services at home. Whereas, such new broadcast-broadband converged networks may find it hard to penetrate Brown Fields especially with the unavailability of the adequate frequencies. Nonetheless, R&S sees high interest into concretizing a co-exitance mechanism between existing DTT (e.g. DVB-T/T2) and new mobile-oriented DTT services like 5G Broadcast in various Brown Fields, especially in Europe.

At the end, R&S believes that it is up to the India broadcast market to classify itself in the right family of the above-mentioned markets and therefore identify which of the fixed TV or mobile services is primary and which one is the secondary. Based on that, we believe that the local broadcast market will then choose the adequate technology from the global market offerings or a combination thereof. Our mission is to always accompany our technology partners not only on various technical levels but also based on their market needs and wherever they see new growth potentials. That is why we equipped our partners with a unique software based terrestrial broadcast infrastructure which allows a lot of flexibility to be able to address futuristic and evolutive technologies, simply with minimum efforts needed such as software upgrades.

In addition to the commercial services to be potentially defined by D2M in India, it is important to highlight that the latter should also focus on providing the citizens with carbon-free and green public services such as barrier-free emergency alerts and Positioning, Navigation and Time (PNT) services that can operate totally independent from the existing GNSS services. Such public services are standard based (e.g., 3GPP) perfectly fitting into the new terrestrial broadcasting solutions (from 3GPP) which can simultaneously run with the content delivery services, extremely efficient and empowers India with its own territorial sovereignty in times of uncertainties and crisis.

Annex – 5G Broadcast

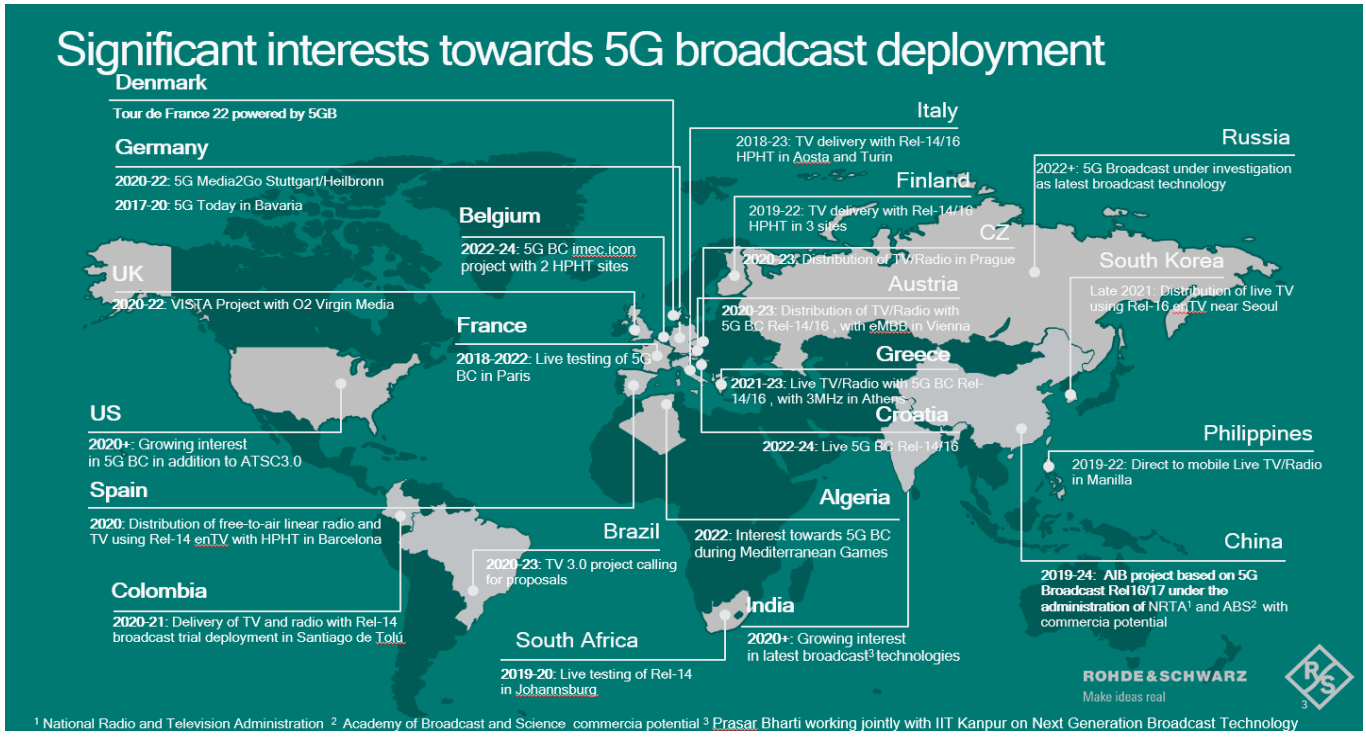
A. Background

LTE-based 5G Terrestrial Broadcast is a broadcast system designed and standardized by 3GPP. As this broadcast system is part of the 3GPP family of standards, it can be fully integrated into 3GPP compliant devices and complemented by conventional mobile broadband data.

B. 5G broadcast brings below technical highlights

- SIM free mode of operation for Receive-only mode (ROM)
- Free-to-air reception (FTA) requiring no uplink
- Flat architecture with simplified broadcast/multicast core and broadcast multicast RAN
- Designed to re-use the existing terrestrial broadcasting infrastructure e.g. HPHT, MPMT and LPLT
- Intended to use the UHF spectrum or part thereof
- Can also be deployed in addition using SDL bands coupled with an UL channel
- Services that require authentication, including encrypted services
- Single Frequency Networks (SFN) and/or dedicated broadcast networks using Multiple Frequency networks (MFN)
- Fixed reception with up to 100KM ISD
- Portable and Mobile reception with up to 250 KM/h
- Service providers can define the desired QoS
- Utilizing standard APIs for easy design and integration in applications and devices

C. Global trials related to 5G Broadcast



In addition to previously known use cases, 5G Broadcast is the right terrestrial broadcast solution to provide the necessary public awareness via remote trainings and enhancing the relationship between the government and the citizens. It can be used in order to enhance the existing PPDR systems, thus optimizing the frequency usage.

On top, 5G Broadcast supports new ways of broadcasting/multicasting where the resources (infrastructure and frequencies) might be shared between various stakeholders in order to create new applications ranging from time-limited local services (like Venue Casting in extremely dense local areas) to nationwide services (like terrestrial based- Positioning, Navigation and Timing) while using limited capacity out of all existing slices.

D. 5G Broadcast in Nutshell

For further details, please refer to the new technical report from TSDSI (TSDSI TR 6015 V1.0.0) release in April 2022, about Service Delivery using 5G Broadcast for TV, Radio, IPTV and File-casting. Below is a comprehensive list of benefits enabling new use cases for the multiple stakeholders' Indian market:

- Distribute public and commercial linear TV, radio services as well as live content, FTA or encrypted, to 3GPP-compatible devices such as smartphones, smart TVs or in-car infotainment systems. The main aim of 5G Broadcast is complement existing cable-provided services namely in the areas where cable connections is not well established

- Enabling personalized media offers by delivering linear broadcast content along with catch-up or on-demand services using the same family of standards (3GPP). With such option, 5G Broadcast is aiming at brining both broadband and broadcast closer. A concrete example of this is to give the possibility to MNOs to (partially) use the existing Broadcasting resources (i.e. frequencies and infrastructure) and create new business incentives between the broadband and broadcast worlds while creating an India-specific model (referring to 5Gi).

- Enable broadcast distribution of linear TV and radio services integrated into existing media applications with 3GPP-defined APIs.

- Enable seamless integration with Public Safety broadcast services (like emergency broadcast messages) with integrated text / multimedia and possibility of add-on interactivity via broadband connectivity

- Flexibility of deployment with high-power high-tower (HPHT), low-power low-tower (LPLT) and medium-power medium-tower (MPMT) depending on the scenario, application, and geography under consideration.

- 5G Broadcast is endorsed by ITU-R (WP6A and SG6) to be considered as a worldwide new digital terrestrial broadcast (DTT) standard and labelled as "System-L".

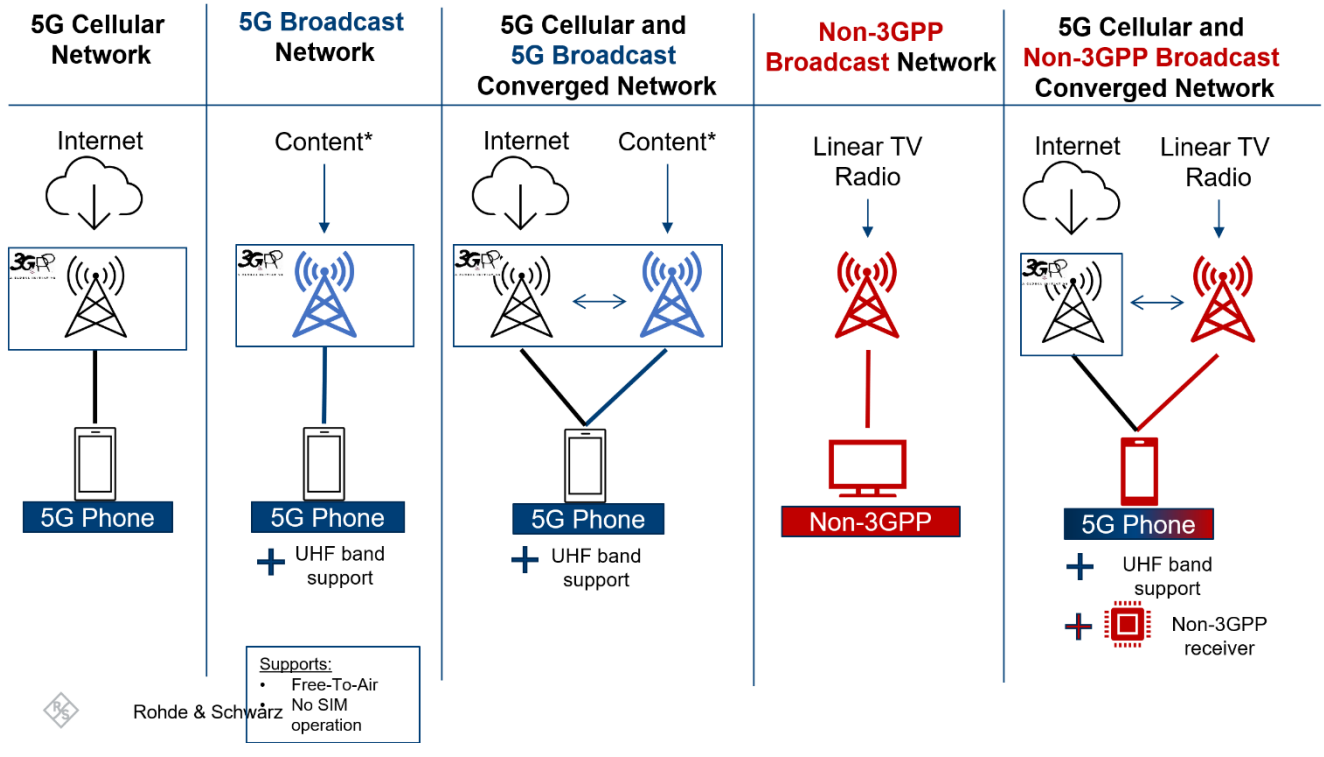
- Austria is the first European country to officially consider 5G Broadcast as a new DTT standard in the country, in addition to the already exiting DVB-T2 services: https://www.ris.bka.gv.at/eli/bgbl/II/2023/61

- European Space Agency (ESA) is seriously considering 5G Broadcast as a potential GNSS back ground-based solution: https://navisp.esa.int/news/article/Resilient%20PNT%20based%20on%205G%20broadcast

E. Main benefits of 5G Broadcast

- 5G Broadcast is a broadcasting technology designed with hardware reuse of cellular modems in mind.
- Features needed for broadcasters (high-power deployments, operation without SIM card, support of UHF spectrum, support of fixed reception) are supported by 5G Broadcast.
- Integration with the 3GPP stack allows for advanced features such as emergency notifications, interactive broadcast, etc.
- The 5G Broadcast system, apart from its ease of integration in handsets, inherits features of cellular systems such as support of multiple antennas, carrier aggregation, etc.
- New band definition work underway in 3GPP for Introducing 6/7/8MHz channel bandwidth. This is a Rel-18 independent WID.
- 5G Broadcast system has seen continuous evolution during the last few releases and may be further enhanced if new use cases / requirements arise.

Below is a picture illustrating the benefit of 5G Broadcast over traditional DTT networks/solutions



References:

1. TSDSI TR 6015 V1.0.0, Service Delivery using 5G Broadcast for TV, Radio, IPTV and File-casting, April 2022
2. ETSI TS 103 720 V1.1.1, 5G Broadcast System for linear TV and radio services; LTE-based 5G terrestrial broadcast system, Dec 2020
3. 5G-MAG Explainer on 5G Broadcast, LTE-based 5G Terrestrial Broadcast for TV and radio distribution, Feb 2021
4. 5G-MAG Explainer on Spectrum, Spectrum for LTE-based 5G Terrestrial Broadcast
5. 3GPP TR 22.816 v14.1.0 “3GPP enhancement for TV service (Release 14)”
6. 3GPP TR 36.976 v16.0.0 “Overall description of LTE-based 5G broadcast”
7. Report on the joint EBU/ITU workshop on “Broadcasting in times of crisis”