The Broadcasting in the Dawn of 5th Generation Wireless Networks

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Current Status of Broadcasting Services in China

DTMB (Digital Terrestrial Broadcast)
Emerging Demand for Broadcasting Services

- **Better Signal Coverage**: Acceptable signal coverage needed in indoors and high-speed scenarios.

- **Better Device Coverage**: Broadcasting services should be adaptable to the majority of future consumer devices based on 5G and WiFi connection, ranging from mobile phone to wearable devices.

- **Better Content Coverage**: Besides traditional live TV, should be capable to broadcast Internet multi-media contents or other data formats needed for public services.

- **Advancement of Technology**: Mature ecosystem and rapid evolution of technology are required by new demand for broadcasting.
Prospective techniques enabling new broadcast services

- **HTTP-Based live streaming is emerging to take over traditional broadcast**
  - HTTP-Based streaming platform: Adaptable to multi-screen, All devices, Anytime, Anywhere
  - Enhance interactive experience and support new live broadcast service features
  - Based on standard server hardware architecture design, using open-source Internet protocols.
  - Robust Internet ecosystem, massive media resources and rich terminal forms.
Prospective techniques enabling new broadcast services

- 5G NR MBS (Multicast/Broadcast Services) will evolve into a kind of universal flexible broadcast technique serving all screens.

Business Cases

- Traditional TV channel broadcasting service
- New interactive video broadcasting service
- Converged information broadcasting service
5G NR Multicast/Broadcast Services

- **Devices:** Broadcasting is no longer limited to TV, but in the form of a universal service application that runs on all types of devices such as mobile phones, tablets, wearable devices, and car consoles. It is a ubiquitous business on all smart devices, any time, anywhere.

- **Business cases:** Not only traditional live TV services, but also provide new interactive video broadcasting services, integrated Multi-media broadcasting services and other new services;

- **Signal coverage:** Achieve good signal coverage with regular cell and high-tower coverage in remote areas as well as indoors in metro areas and high speed moving vehicles.
The 5G NR Multicast/Broadcast has following advantages:

- Based on the NR unicast solution, no need to change the regular 5G UE hardware design.
- Flexible to serve all scenarios ranging from remote areas to metro hotspot or fast-moving use cases.
- Support IDLE/INACTIVE State, no-SIM card receiving
- Support dynamic unicast/multicast switching
- Support both regular cell and high-tower coverage
Broadcast is essential to Rel-17 NR MBS

- CBN proposed two papers in 3GPP #89 RAN and SA Plenary meetings in September, discussing the importance of supporting broadcast in Rel-17 NR MBS. The support of broadcast services in NR MBS has been confirmed explicitly by both plenaries.

- NR MBS with only multicast is just a feature improving network efficiency. With Broadcast, NR MBS creates new business models serving more scenarios, as well as enabling the 5G refarming of the broadcast-dedicated spectrum in many countries.
NR Broadcast: Enable new business cases

Public Services

Government and public service entities have urgent demand for 5G-enabled innovative ways of communicating with citizens. Broadcast shall be adopted to more efficiently deliver real-time emergency multi-media notifications to a wide variety of devices under the scope of public safety (like disaster warning, security, pandemic control, etc.).

Multimedia Live Streaming in crowded activities (Concerts/Sport Games)

Innovative broadcast services like Multi-angle live viewing, game statistics broadcasting, XR enhanced viewing, etc. Broadcast mode is essential for such high-bitrate-high-concurrency services. CBN is planning to showcase innovative NR MBS broadcast services in Beijing Olympic Winter Games 2022.
NR Broadcast: Enable new business cases

- **Massive IoT**
  Identical content needs to be distributed to a massive number of devices like smart home appliances. It is inefficient to use unicast/multicast for this, but ideal for broadcast. It makes OTA (over-the-air) firmware upgrades/group messaging/etc. much more efficient.

- **V2X**
  Broadcast enables vehicles to efficiently communicate with the network and its surroundings, making the network to more efficiently deliver real-time information, such as software and traffic updates, as well as the emergency Multi-media notifications to the vehicle driver/passengers.
Key features to verify

- 5G NR unicast/multicast/broadcast flexible switching feature.
- The non-SIM Card receiving function in FTA mode.
- Dynamic and differentiated cell-based broadcast feature
- Collaborative coverage with High-tower and regular gNB
- Frequency arrangement optimization for various scenarios:
  1. High-tower coverage and regular cell overlap
  2. Adjacent regular cells with same broadcast service
  3. Adjacent regular cells with different broadcast services
5G NR Multicast/Broadcast Trial

Scenario 1: Test User Equipment/Customer Premise Equipment + Set-top Box

Scenario 2: Broadcasting on Cell Phones from multiple operators
1st Step: Set up the unicast data radio barrier and get Cell Radio Network Temporary Identifier by Background UE
2nd Step: Generate the multicast/broadcast stream to Demo UEs (using the G-RNTI which is then same as C-RNTI above)
CBN's 5G Broadcast Network

CDN: Content Delivery Network
NR: New Radio
UE: User Equipment
CBN completed the submission and discussion of 5G broadcast proposals at the 88th & 89th 3GPP RAN and SA plenary meetings, promoting 5G NR broadcasting mode.

23 out of 25 involving companies confirmed the broadcasting support in Rel-17 NR MBS.
Evolved TV services based on **HTTP protocols** over **hybrid network** and **smart devices**

HTTP-based streaming & 5G NR Multicast/Broadcast ensure new TV services:
All devices, All content, Any time, Any where

- **Mobile Access:** 5G (700MHz, 3.3GHz, 4.9GHz, mmWave)
- **Wired Access:** Cable+FTTx, All-IP based cable TV services, broadband access
- **Media:** Converge the traditional media and emerging new media by content aggregation and “hybrid” distribution
- **Maximized Coverage:** Serve customers from household customers to individual customers, serve devices from TV to cell phones/tablet/laptop/smart devices etc.
Overall planning of the CBN Convergent Service Platform based on 5G and Cable hybrid network
Thank You!