The eMBMS Puzzle: The Gateway to Success

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Every now and then, a technology surfaces that completely alters the way we see and do things. However, how many such "game-changing technologies" got to where they were just because of the spectacular science behind them? It's not just the ingenuity behind a technology but multiple other factors that contribute to its success. For instance, the simple boom box takes the prize for the fastest adopted consumer electronic product – not the cellular phone or color television[1]. So, what determines the rapid diffusion and acceptance of new technology?

In our view, it's a combination of multiple factors: market judgement of the uncertain benefits versus the uncertain costs, compatibility and complementarity with existing investments, open standards and the support eco-system[2]. Can Evolved Multimedia Broadcast and Multicast Services (eMBMS), a recent arrival in the 4G / LTE industry, become the new industry standard in network communication?

Mobile multimedia broadcast has been around for over a decade but has failed to gain traction. Many past efforts were based on proprietary standards which were built as isolated technologies with huge cost implications. Today, mobile multimedia broadcast is back with the tantalizing arrival of eMBMS that has several factors for it to be successful.

There are multiple factors that will determine the success of eMBMS networks. These range from building new network elements and integrating them with existing LTE systems to extensive field trials and device qualification tests. This paper throws light on the elements necessary to complete the eMBMS puzzle.
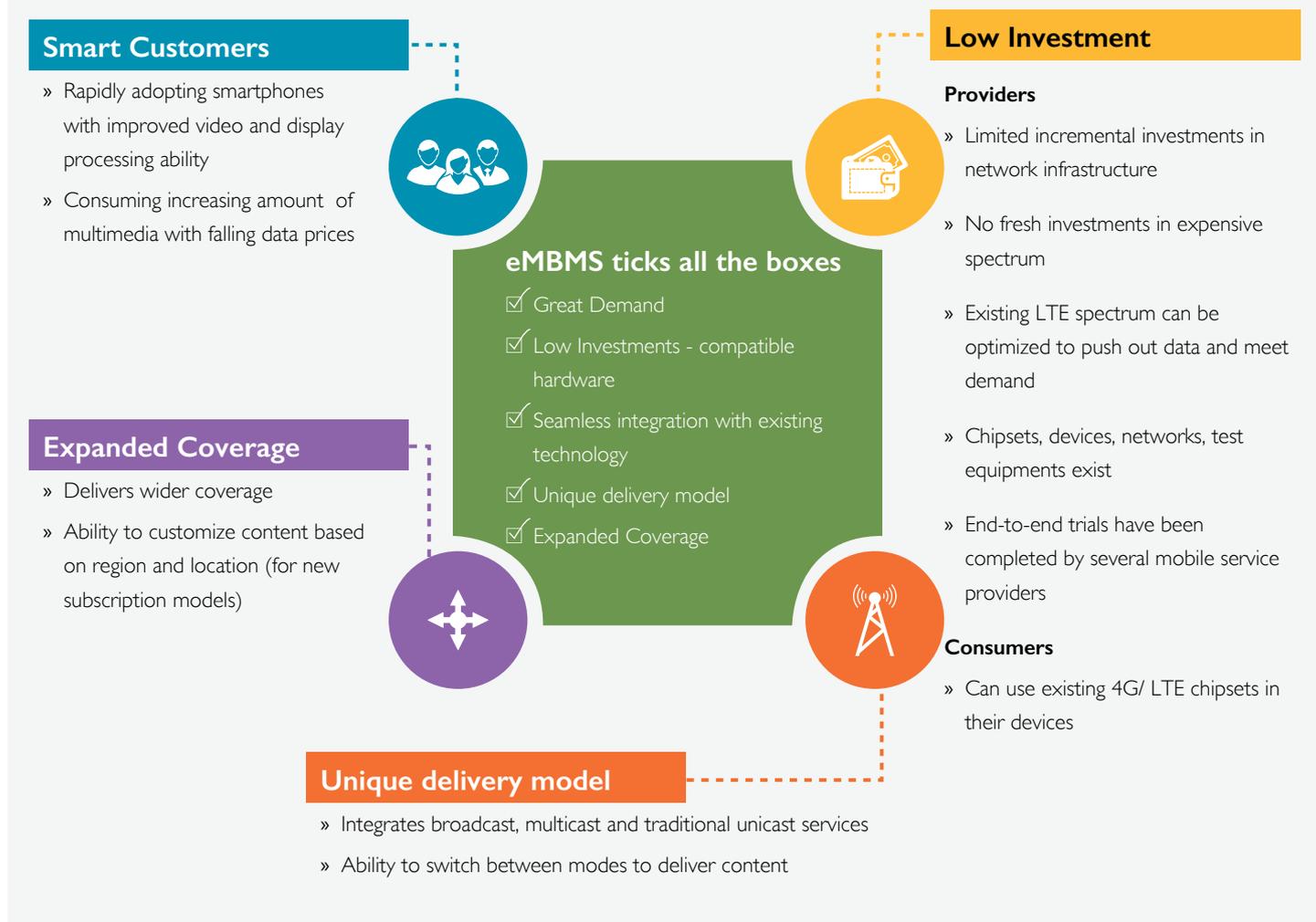
FACTORS FAVOURABLE FOR MASS ADOPTION OF eMBMS

Smart Customers

» Rapidly adopting smartphones with improved video and display processing ability

» Consuming increasing amount of multimedia with falling data prices

Low Investment

Providers

» Limited incremental investments in network infrastructure

» No fresh investments in expensive spectrum

» Existing LTE spectrum can be optimized to push out data and meet demand

» Chipsets, devices, networks, test equipments exist

» End-to-end trials have been completed by several mobile service providers

Consumers

» Can use existing 4G/ LTE chipsets in their devices

eMBMS ticks all the boxes

☑ Great Demand

☑ Low Investments - compatible hardware

☑ Seamless integration with existing technology

☑ Unique delivery model

☑ Expanded Coverage

Expanded Coverage

» Delivers wider coverage

» Ability to customize content based on region and location (for new subscription models)

Unique delivery model

» Integrates broadcast, multicast and traditional unicast services

» Ability to switch between modes to deliver content

Figure 1: Factors favorable for mass adoption of eMBMS

Factors Influencing Realization of eMBMS

Vendors and Realization

The challenge is to create an eco-system of vendors who can deliver the new network elements and software components. The choice of vendors has a deep impact on the realization of eMBMS. The selection is roughly determined by six factors:

• Defining provider and end-customer needs

• Cost of operations, power, etc.

• Co-existence with existing LTE networks

• Interoperability with network equipment of other vendors

• Ruggedness / Stability of the system

• Ability to scale when needed

Integration and Deployment

LTE systems have chiefly been created around data services. Integrating new types of multimedia content originating from providers with varying multimedia standards and systems could be challenging. New interfaces and elements will come into play, placing barriers before the smooth flow of multimedia traffic (see Table 1 for integration needs).

Once the integration is done, the focus needs to shift to three key success factors:

• Network planning to enable optimal and efficient use of resources that provide the required Quality of Service (QoS)

• Network configurations such as MBSFN[3] synchronization area, MBSFN service area, MBSFN area and MBMS session that control the availability of content within geographies

• Measures to manage interference from other broadcast signals so that QoS is maintained

Table 1: Aspects that need to be considered when integrating new network elements	
Admission Control	eMBMS, being a service that could be a subscription based story, requires session admission control that takes care of the admission of UE to access the service.
Radio Resource Allocation	Managing the radio resource allocation for the various eNB in the MBSFN area for multicell eMBMS transmissions.
Session Control	eMBMS being able to offer localized, regional or broadcast content establishes multiple sessions. Each of these sessions needs a Start / Update / Stop and end-to-end signaling from the network through many interfaces to UE.
Bearer Content Processing	For the content to meet the quality of service, multiple protocols such as FEC, FLUTE are used to cater to dynamically changing radio conditions.
Counting of eMBMS Users	Counting procedure is initiated by the network to know the amount of active UE interested in the services – and create a response from UE aimed at preventing overload.

Field Trials and Device Qualification

Multiple network tests, covering the complete range of use cases, with real world scenarios is necessary. This includes interoperability testing across networks, handsets, tablets, in-car systems (generally speak, every mode of transport that could demand streaming / live multimedia content) before commercial rollout. The complexity of testing is a factor of:

- Different device solutions / chipsets from vendors and OEMs that needed to be qualified to work on an eMBMS platform

- Ability to test in real life situations such as movement of subscriber across cells while accessing multimedia content or simulate each real life scenario

Range of tests include field tests covering specific provider routes, basic lab testing, interoperability tests, conformance testing (such as those mandated by the Global Certification Forum and the PCS Type Certification Review Board), multimedia reception as the mobile is moved across different cells / locations, and IoT in a controlled network environment in addition to the unique test specifications defined by each provider along with customizations[4]. All of this requires considerable time and monetary investments.

Key Performance Indicators

Ultimately, the diffusion of technology is highly dependent on the ease of use and its perceived value. The lead performance indicators that will signal the wider success of a technology – beyond a dazzling demonstration of what science and engineering can achieve – are the QoS indicators determined by network coverage (for instance, no buffering of multimedia content with jitter-free delivery when subscriber switches content channels) and network resource allocation (for instance, continuity of service when subscriber switches from free-to-air to paid service).

Conclusion

While all the pieces of the eMBMS puzzle are in place to deliver rich multimedia content, we are still some distance from fully realizing the service. Integration and testing along with factors such as interoperability and network capacity, the service mix and innovative revenue models will dictate success. Providers worldwide are under pressure to deliver high quality, customized multimedia content to customers while minimizing their investment costs and creating new revenue streams. Will operators bow down to this pressure and adopt an industry standard that can help them check all these boxes? Time alone will tell.

References

1. http://www.theatlantic.com/technology/archive/2012/03/guess-whats-the-fastest-adopted-gadget-of-the-last-50-years/254948/

2. As an example, if there were no magnetic tapes and music producers were not willing to create pre-recorded music, there may have been no boom box.

3. Multicast-broadcast single-frequency network

4. Global Service providers have their own test specification defined for major features

About the Author

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Vishnu comes with over 17 years of experience in the wireless industry. He has worked across the entire software development lifecycle of cellular modem in 2G & LTE roll-outs as well as in M2M communication.

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