GSC20 New Delhi

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Spectrum requirements & Challenges

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Session#3:GSC Task Force Presentation

<to be given by TSDSI>

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Indian telecom market

High Density | Low ARPU | High Spectrum Cost

	Population	Connections	% Prepaid	% 2G	% 3G	% 4G	Teledensity
India	**1.27 B**	**1.0 B**	**95%**	**88%**	**11.5%**	**0.5%**	**75%**
USA	**324 M**	**330 M**	**26%**	**14%**	**38%**	**48%**	**102%**
China	**1.4 B**	**1.3 B**	**79%**	**51%**	**38%**	**12%**	**93%**

Source: GSMA estimates

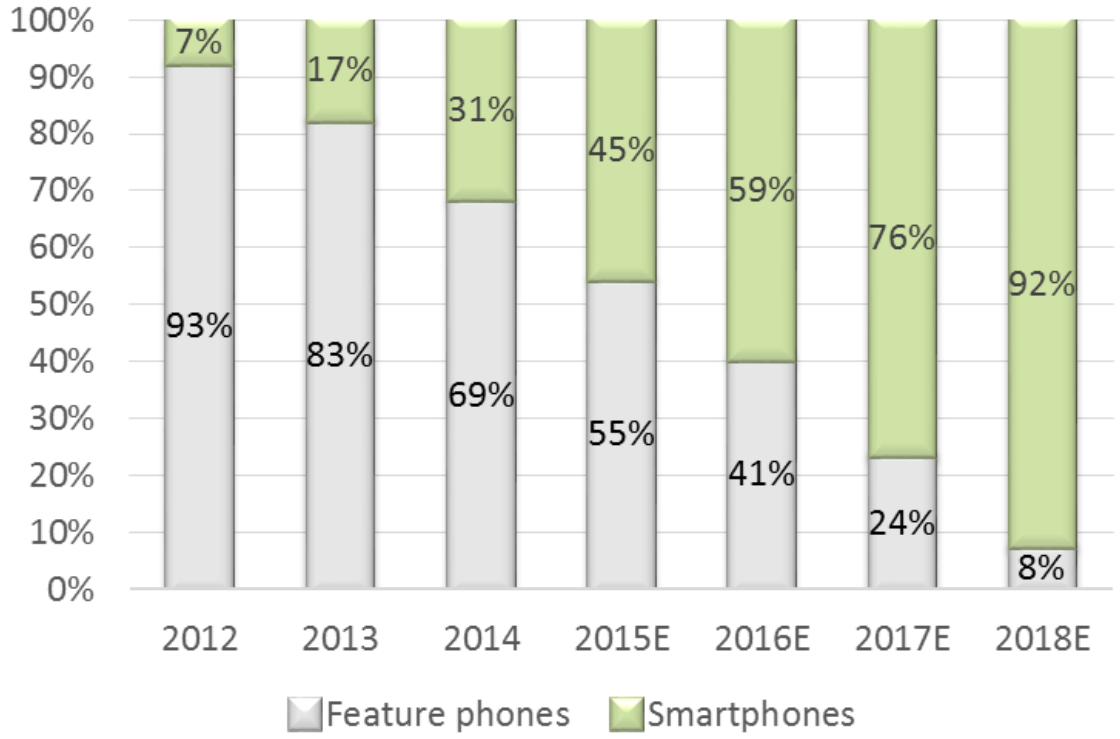
1. @350Mn Second largest internet population in world behind China
2. @140Mn – Second largest Facebook population in the world
3. @100Mn – largest What'sapp users in the world
4. More than 90% users on mobile against world average of 74%

Smartphones – capability & affordability

148M smartphone expected in 2016
60% being 4G capable

DC-HSPA **4G** **LTE-CA** **LTE-U**

CSFB **VoLTE** **VoWiFi**



Source: IDC, J.P. Morgan estimates

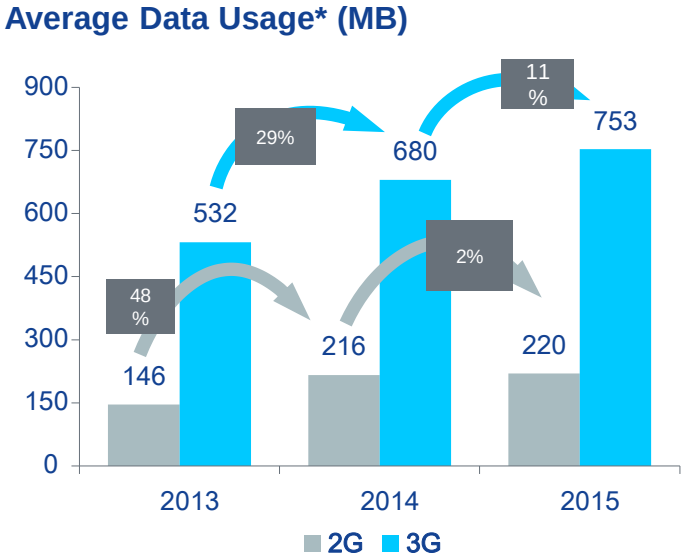
Device mix changing rapidly with affordable smartphones

Consumption is increasing

18min per day per user

90% user are on mobile

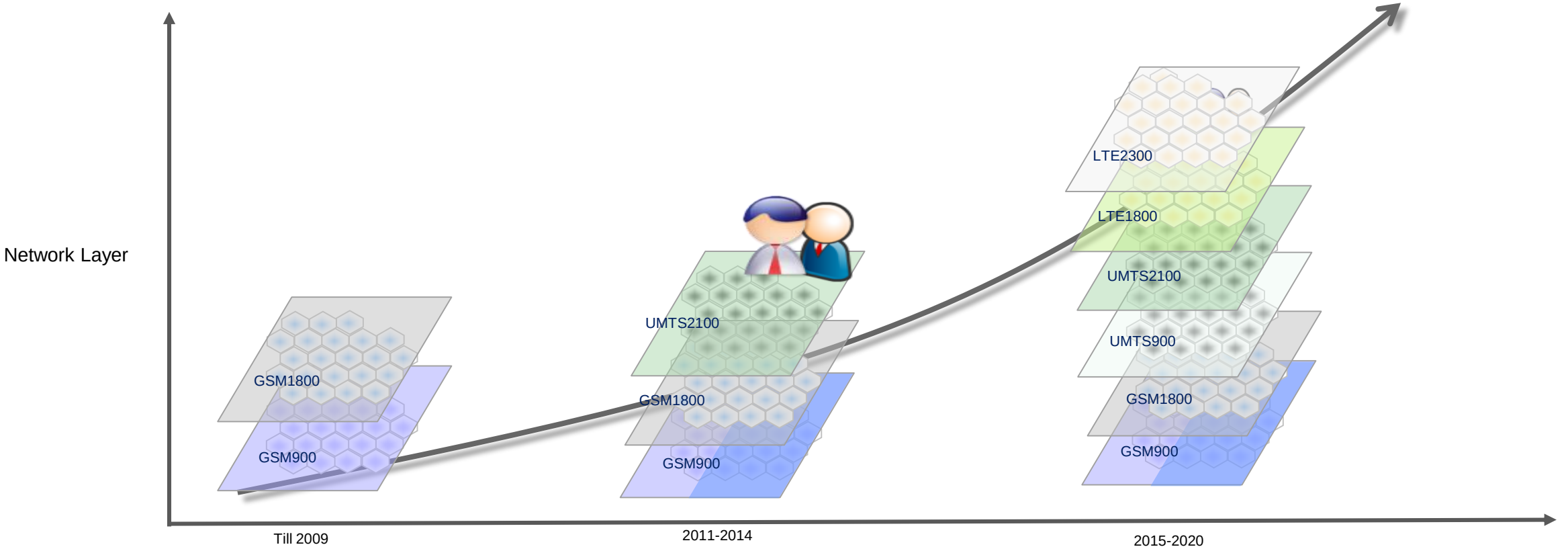
Text -> Multimedia in social networking



Delhi data traffic 75TB -> 160TB

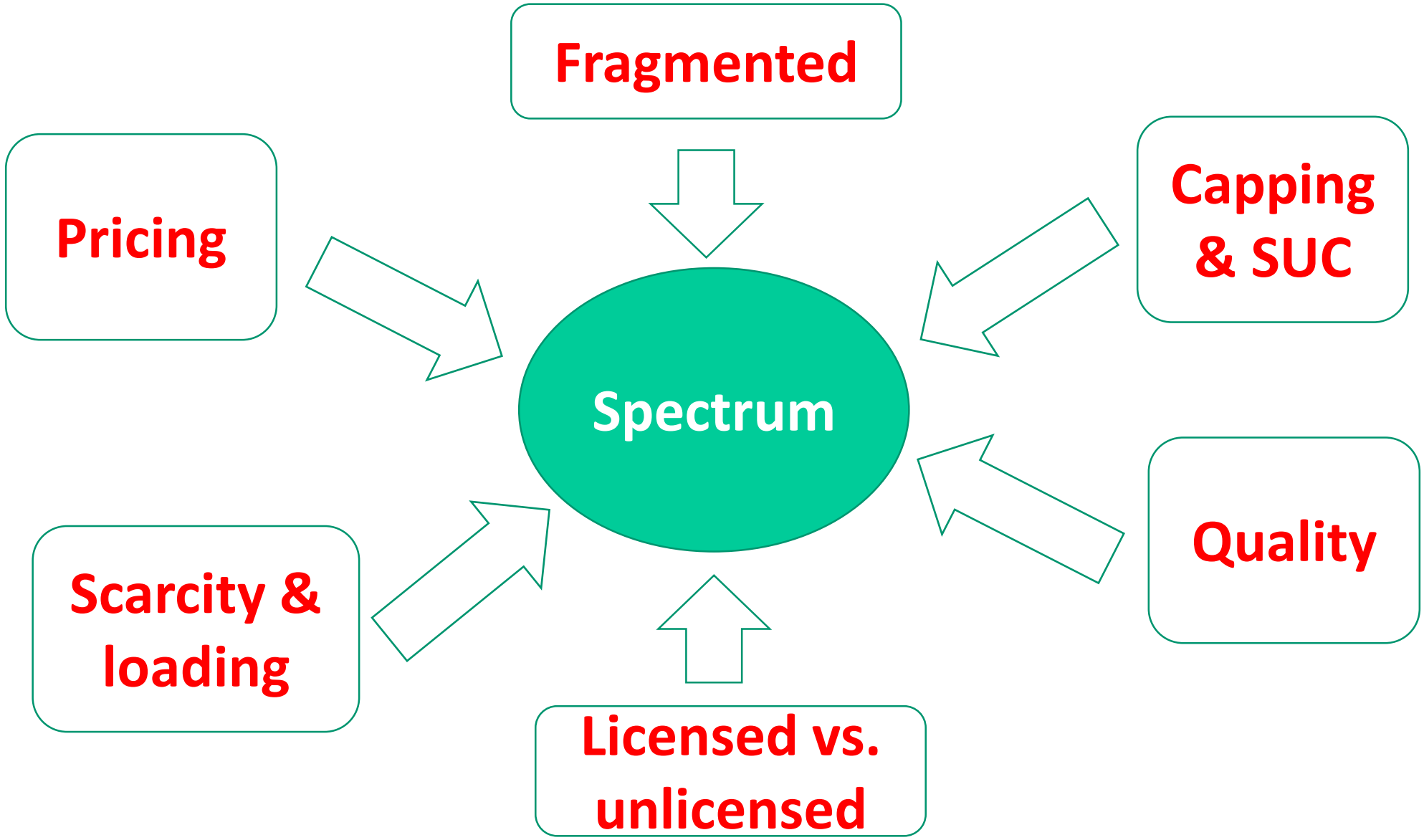
5x network resources consumed due to “always on” data services

Evolving heterogeneous network



Managing customer experience & traffic across technologies

Spectrum challenges in India



Network stress – due to capacity & usage

- 1/3 to 1/9 spectrum per service area
- 1.2x to 2.5x Minutes Of Usage per customer
- 2x to 3x subscribers per base station
- 80% usage on chatty applications like Whatsapp, Facebook, Gtalk
- 42% (of top 30%) 3G devices - poor quality

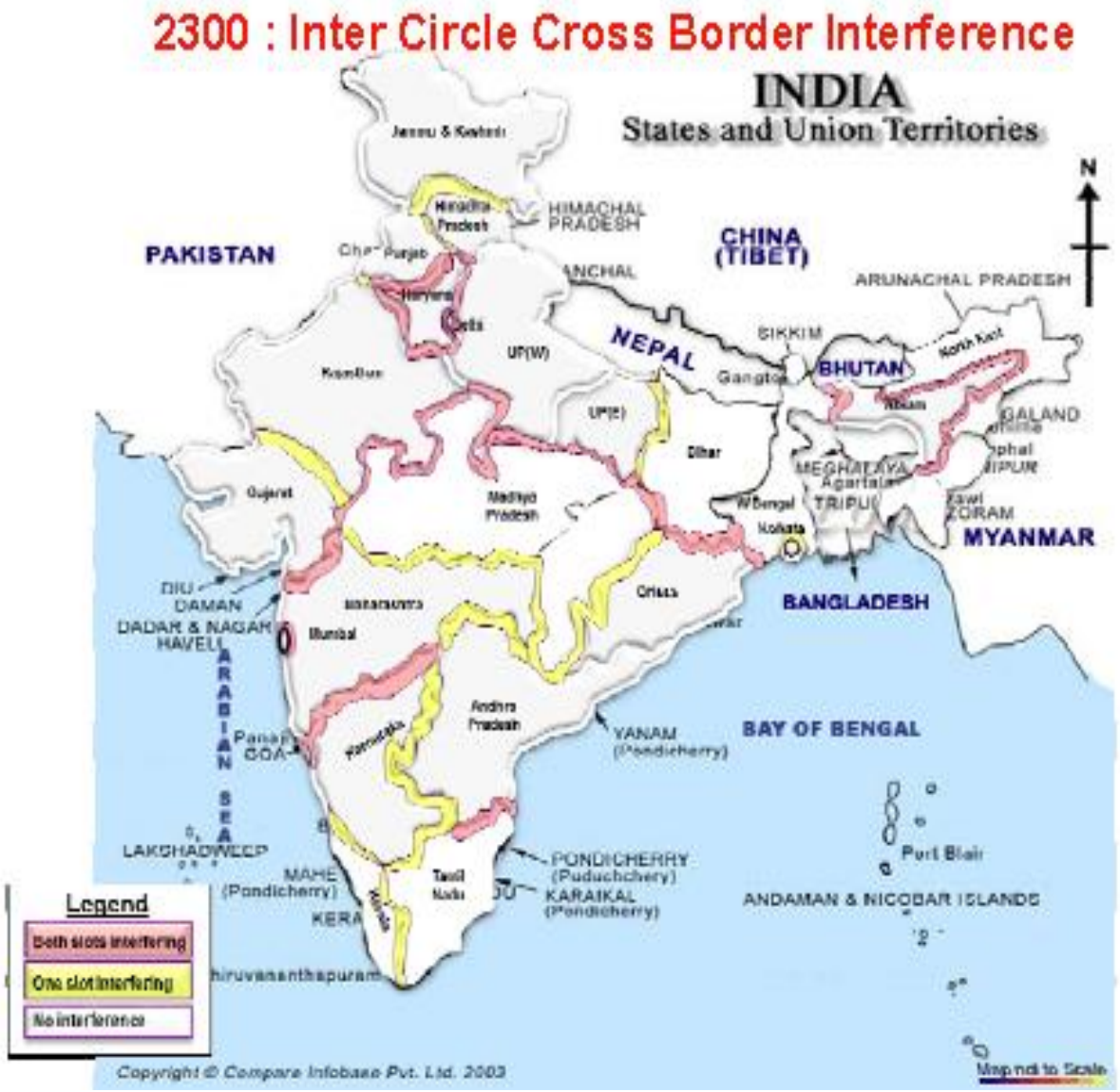
7x to 35x higher loading

Fragmented spectrum – across bands

Band	Total spectrum	earmark for Telecom	Allocated spectrum	5MHz blocks	Reserved for Defense / Non Telecom	Spectrum yet to be sold / released
700	2x45MHz	2x35MHz	-	100%	2x10MHz	2x35Mhz
800	2x20MHz	2x19MHz	2x14.3MHz	<40%	-	2x4.7MHz
900	2x25MHz	2x20MHz	2x19.1MHz	<50%	2x5MHz	2x0.9MHz
1800	2x75MHz	2x55MHz	2x44.8MHz	<30%	2x20MHz	2x10.2MHz
2100	2x60MHz	2x40MHz	2x23.6MHz	100%	2x20MHz	2x16.4MHz
2300	1x100MHz	1x60MHz	1x40MHz	100%	1x40MHz	1x20MHz
2600	1x190MHz	1x40MHz	1x20MHz	100%	1x150MHz	1x20MHz
Total	**740MHz**	**438MHz**	**263.6MHz**		**300MHz**	**174.4MHz**

lower channel bandwidths for LTE deployments

Interference – cross border & cross circle



Support from 3GPP standards

- Carrier aggregation across different bands, TDD & FDD, non-contiguous carriers, licensed & unlicensed bands & low channel bandwidth
- Harmonization of TVWS spectrum for IMT technologies
- Innovative techniques for better user experience with limited spectrum
- Managing spectrum interference
- Addressing concerns on radiation specially pervasive radiations from IoT / M2M devices

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Thank you

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