

700 MHz: Opportunity?

Alberto Boaventura

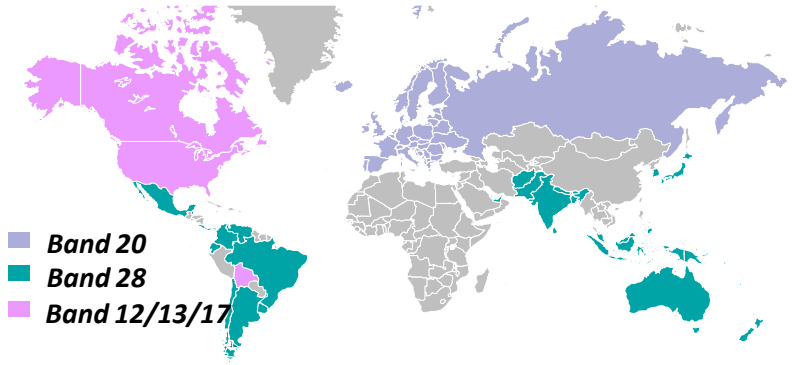
2014-05-27

V1.0

Why 700 MHz?

Main Motivations

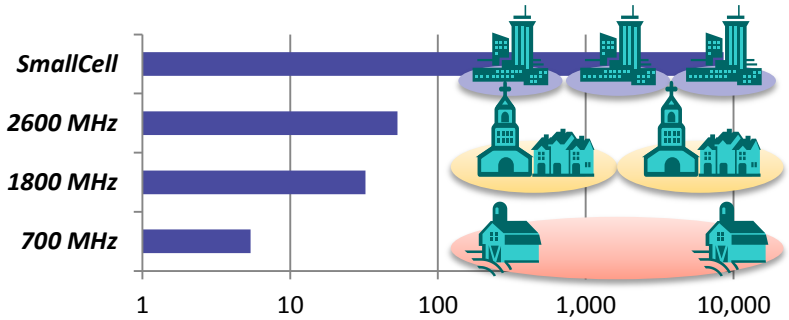
- ✓ There is a lack opportunity for band below 1 GHz.
- ✓ International Roaming : WRC'12 confirmed the intention to allocate more spectrum to IMT in the 700 MHz band (~90 MHz). WRC'15 APT700 will be harmonized in all Regions for IMT.



- ✓ WLL Broadband : Represents an alternative for ADSL access in suburban and rural areas as happen in several countries ;
- ✓ Capacity: Composes in conjunct with remainder bands for increasing capacity offering;
- ✓ Carrier Aggregation: Serves as additional bands for increasing user throughput;
- ✓ Coverage: Increases outdoor and indoor coverage and saving overall CapEx

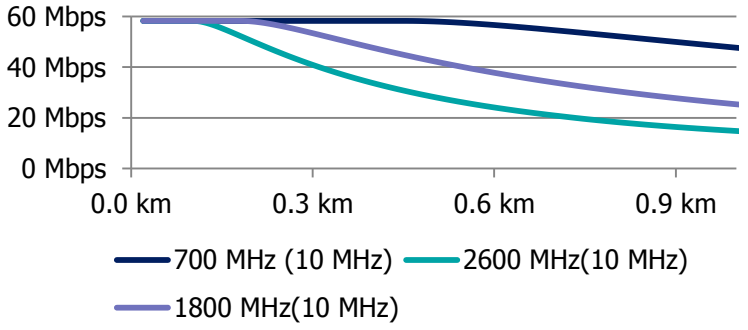
Outdoor Coverage

- ✓ In theory, the cell range ratio between 2600 and 700 MHz is 3-4 times, that means in 700 MHz needs less 14 sites compared to 2600 MHz.



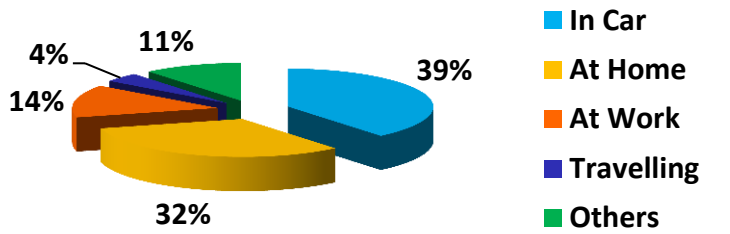
Traffic Density for LTE 50 PRBs (Mbps/km2)

- ✓ Low density traffic: Important for service introduction phase when the traffic density is not representative;



- ✓ Comparing to 2600 MHz, LTE 700 MHz sustains average throughput , improving customer experience;
- ✓ Overall coverage improvement due: good propagation; shadowing and obstruction immunity etc;

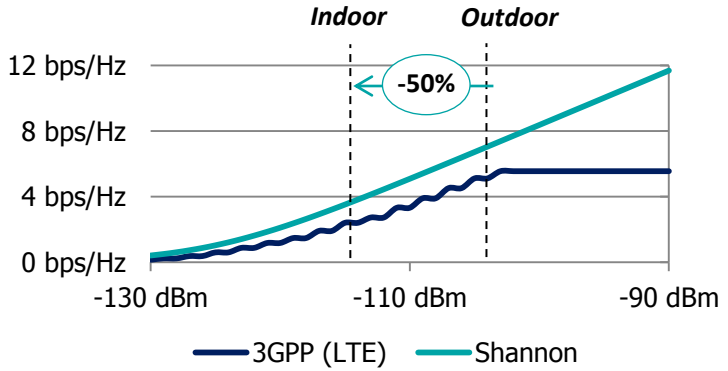
Indoor Coverage



Source: SmallCell Forum

- ✓ 50% of voice traffic and 80% of data traffic are performed in indoor environment;
- ✓ Building Penetration Loss for 700 MHz can be 10 dB lower than 2600 MHz, that is around 21 dB;

RSRP vs Spectral Efficiency (3GPP TS 36.213)

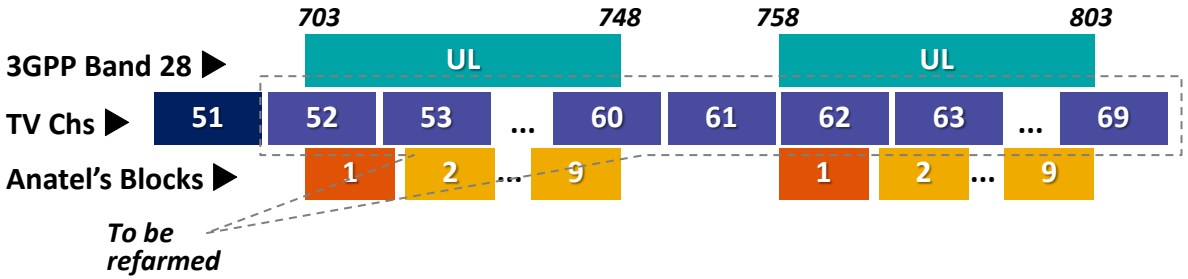


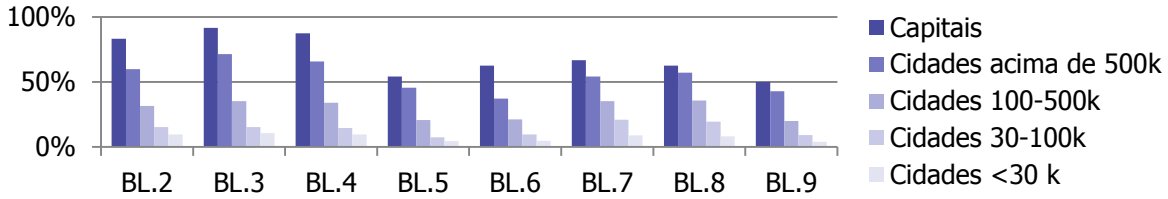
- ✓ 2600 MHz has indoor capacity lost around 70% comparing to 700 MHz;

Why there still exists uncertainty?

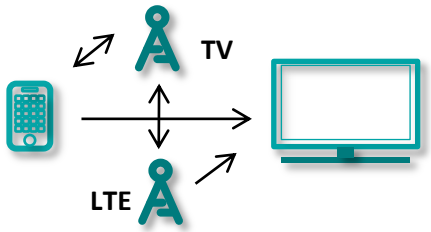
Spectrum Cleanup and Interference issues

Spectrum Cleanup



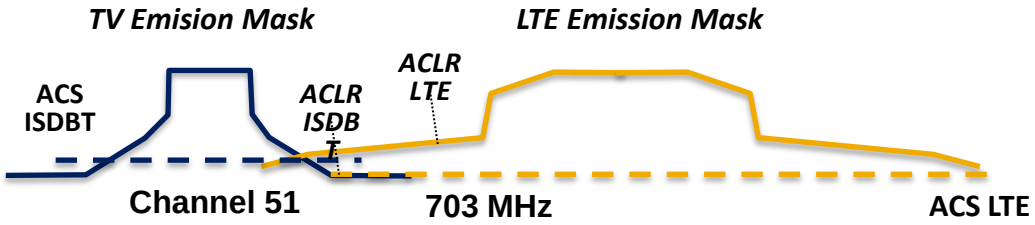


Interference

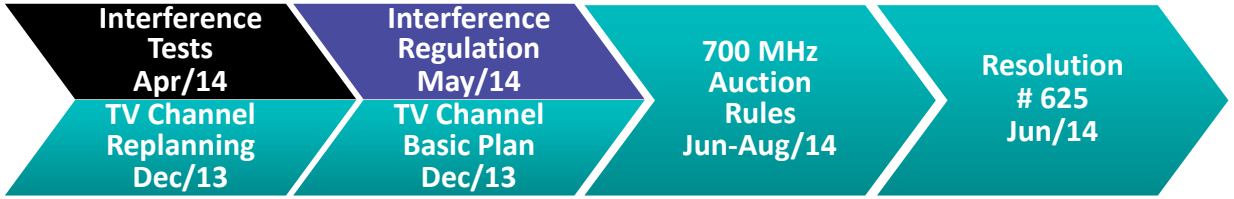


a) TV interferes in LTE: lost LTE performance specially in uplink

b) LTE interferes in TV: Image blocking and signal interrupting



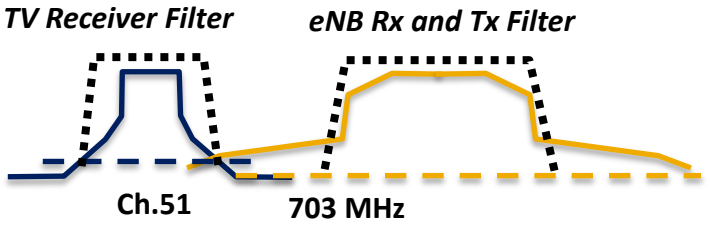
Brazilian New Auction

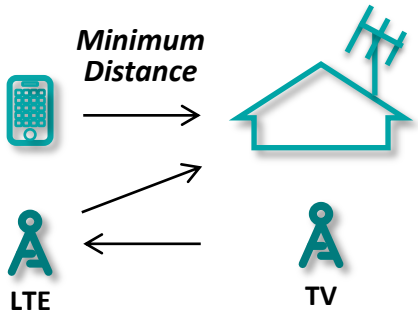


Res. #625

✓ *The purchasers of the 700 MHz band will cover the costs of redistribution and solutions for mitigating interference in broadcasting systems;*

Interference Mitigation





- ✓ *Filter utilization in TV Receiver and eNB Rx and Tx*
- ✓ *Allocation of power, azimuth and distance between TV transmitters and LTE;*
- ✓ *External antenna Installation for Digital TV;*
- ✓ *Rules coexistence of LTE in rooftop installations and collective antennas;*
- ✓ *Impacts on RF planning and acquisition of new sites;*

700 MHz Auction Rules

- ✓ *Costs of redistribution TV channels and solutions to mitigate interference in broadcast systems;*
- ✓ *Distributed one Digital TV Converter with optimized performance or with filter 700 MHz for each family registered in the Federal Government Bolsa Família Program.*
- ✓ *Distributed where necessary to each family registered in the Single Registry for Social Programs of the Federal Government.*
- ✓ *Rural broadband service with mobility;*
- ✓ *Each eNB with 500 Mbps and 1 Gbps in backhaul on 2017 and 2020 respectively.*

¡Gracias!
Thanks!
Obrigado!

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