

C-Band: 3400-3800 MHz

Our vision and latest updates

NMHH public hearing

Budapest, December 4th 2014

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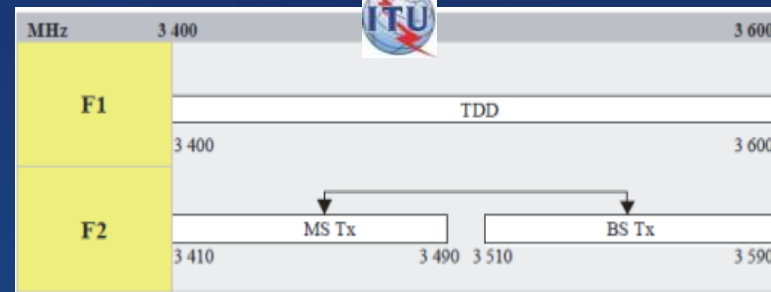
Capacity Band for LTE-A HETNETs



- Unique band: **largest contiguous spectrum**
- Densified high capacity **HET**erogeneous **NET**works: **Macro** (incl. backhaul), **Small Cell** (indoor & outdoor) w. high geographic spectrum reuse
- Targeting **Urban and suburban areas**
- Addressing the **traffic challenge** (video-driven) and EU Digital Agenda objectives for 2020
- Enabling **innovation for LTE-A and its evolution** (TDD/FDD CA, “massive CA”, wide ch. BW, ...)
- Advanced spectrum **sharing** techniques w. incumbent Fixed / Fixed Satellite services
- Growing **Global ecosystem** (3400-3700 MHz)
- **Short term decisions** would deliver required predictability and regulatory certainty



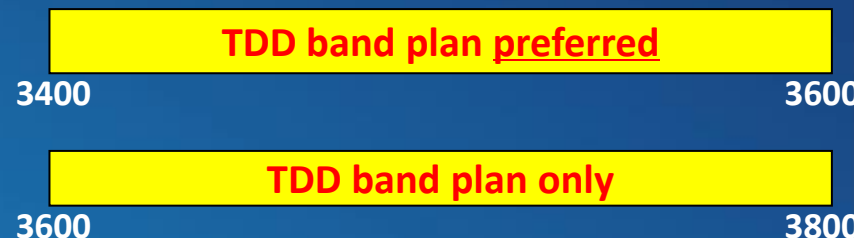
3400-3800 MHz Fully Harmonized in Europe



3GPP E-UTRA Band	UL (MHz)	DL (MHz)	Duplex Mode
22	3410 – 3490	3510 – 3590	FDD
42	3400 – 3600	3400 – 3600	TDD
43	3600 – 3800	3600 – 3800	TDD



5MHz blocks
↔



Regulation and standardization fully completed:

ITU-R

- 3400-3600 MHz: IMT identification
 - In 41 CEPT countries + 40 countries in Region 1
- 3600-3800 MHz: secondary Mobile allocation
 - In Region 1 (Europe, Middle East & Africa)

3GPP

- 3400-3600 MHz: FDD & TDD band plans defined
- 3600-3800 MHz: TDD-only band plan defined

CEPT / ECC

- H1 '14: amended ECC/DEC/(11)06 providing updated harmonization (BEM & band plan)
- 3400-3600 MHz: TDD band plan preferred by CEPT
- 3600-3800 MHz: TDD band plan as only option

European Commission

- May '14: EC Decision 2014/276/EU (amending 2008/411/EC)

**Europe, key driver for the harmonization of the 3400-3800MHz range globally
(based on LTE-A TDD)**

3.5GHz Band Global Availability – Short Term



Ongoing planning in 10+ countries globally (including key markets)



Japan 2014
3.5GHz beauty context
(120MHz, 3 MNOs)



China 2014
3.5GHz field validation



USA 2014
3rd consultation
100MHz @
3.55-3.65 GHz



Australia 2016
1st Consultation



Singapore 2015
3.5GHz in national BB plan



Canada 2015
2nd Consultation
(250MHz @
3.5 & 3.7 GHz)



UK 2015 ?
3.5GHz auction:
150MHz, 3 MNOs
(3.7GHz available,
274MHz in total)



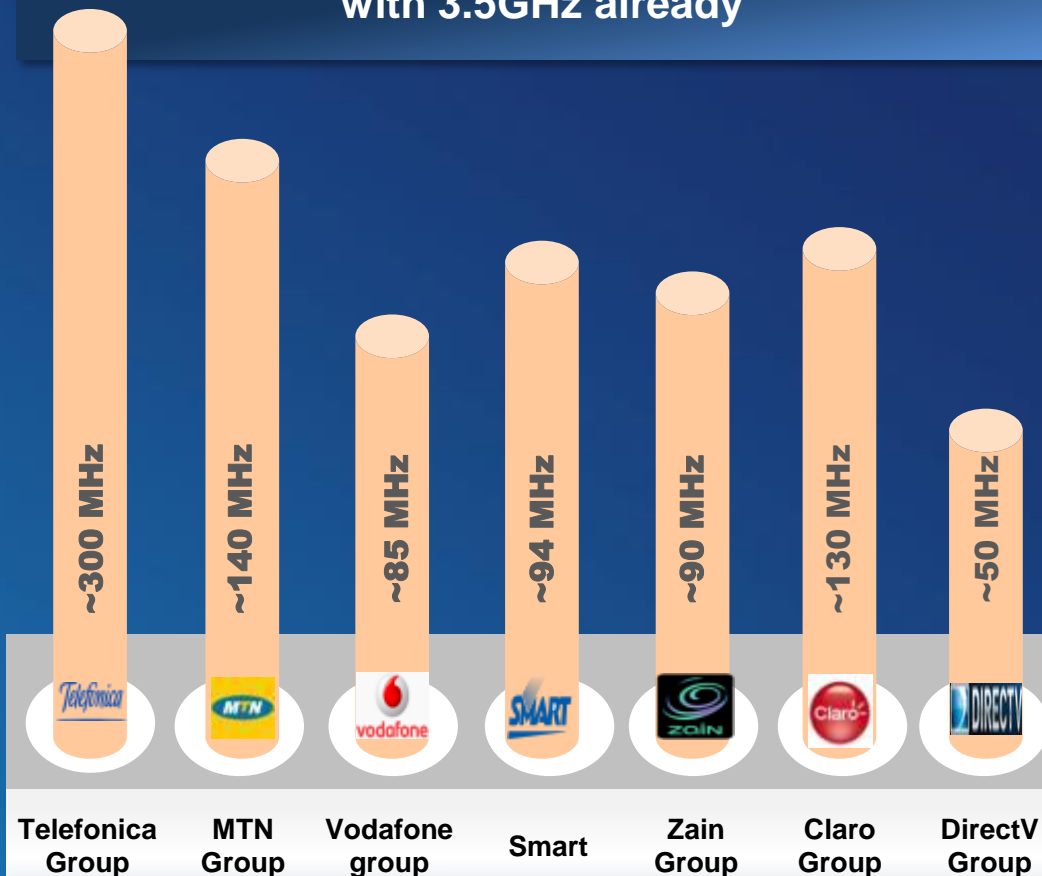
France 2015
1st consultation
for 3.7GHz auction
(3.5GHz available)



Italy 2015
2nd consultation
for 3.7GHz auction
(3.5GHz available)



Key global operators “are familiar” with 3.5GHz already

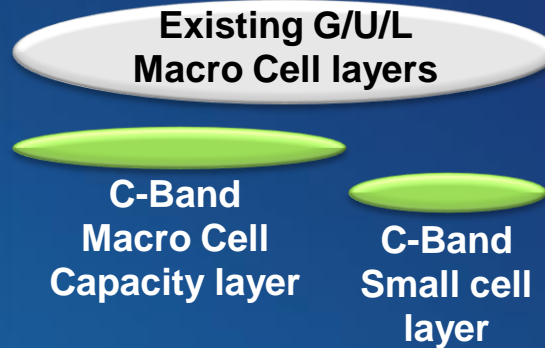


Usage Scenarios - Examples

Mobile BB service



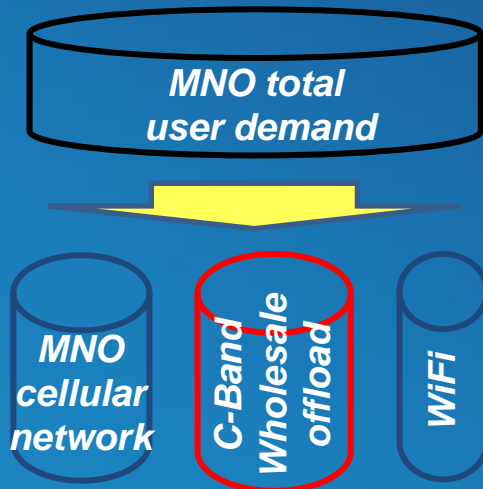
Capacity layer / small cell in GUL network



WBB for home & enterprise



Wholesale data offload



Wireless Backhaul



E.g. for small cells

Enhanced business services



Emergency communication



Data transmission for vertical markets

Wide Coverage

Deep Coverage



Enough
Site
Space

Less
Site
Space

Less
Antenna
Space

Backhaul
Shortage

Outdoor
Hot / Blind
Spot

Indoor
Hot / Blind
Spot



DBS



Blade Site



AAU



Relay



Atomcell



Easy
Macro

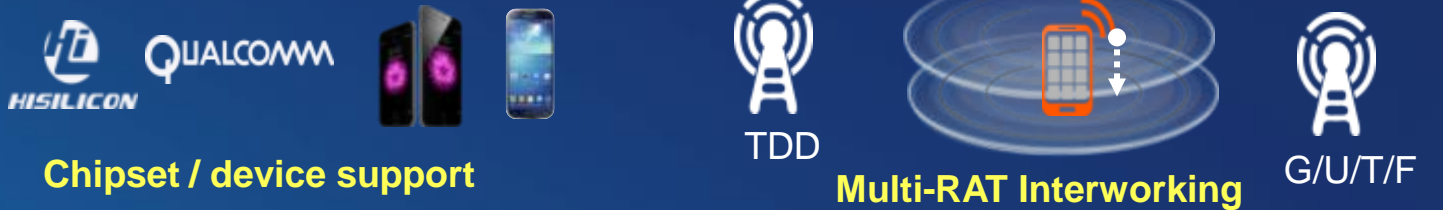


LampSite

One LTE: Full Convergence between FDD & TDD



Step 1
Terminal
Convergence



Step 2
Network
Convergence



Step 3
FDD/TDD CA
Full Convergence



18 TDD/FDD convergent commercial networks



From Fixed Wireless Access to Mobile BB

3GPP Band 42 - 200MHz (3400-3600)

3GPP Band 43 - 200MHz (3600-3800)

Wave I (Wireless BB)



Wave II (WBB & MBB)



3.5GHz will be assigned within 2014 to 3 tier-1 operators (beauty-contest)

40MHz block / operator

Commercial networks within 2016 (LTE-A)

50% pop. coverage in key cities

CA with other bands to achieve 1Gbps goal

100,000+ BTS market expected

3.5GHz LTE-A Carrier Aggregation 770 Mbps peak DL in Tokyo's Field Network



SoftBank, Huawei LTE-A field trial in Tokyo reaches 770 Mbps with Carrier Aggregation technology

www.fiercewireless.com/tech/story/softbank-huawei-lte-test-reaches-770-mbps-35-ghz-band/2013-09-15



Peak DL t-put: beyond 770 Mbps



Average DL t-put: beyond 500 Mbps



Customers on the demo bus



Vendors & Analysts



Interview after demo

- **Widest contiguous spectrum**, key for **LTE-Advanced** and of its evolution
- Suitable for denser **high capacity HET**erogeneous **NET**works:
Macro (shorter range, incl. backhaul), **Small Cell (indoor & outdoor)**
- High geographic spectrum reuse
- Growing **TDD ecosystem**: smartphone chipsets in early '15
- **One LTE**: FDD/TDD full convergence in one network & device - **FDD/TDD Carrier Aggregation**
- In order to maximize benefits to end users:
 - **TDD band plan** should be selected for 3400-3600 MHz and 3600-3800 MHz – benefiting from the economies of scale which are being established globally
 - **Full refarming** of existing point-to-multipoint systems should be managed
 - **Inter-operator synchronization** should be required / encouraged
 - Widest possible assignments per operator: **40MHz lots at least**



10 YEARS OF CONNECTING EUROPE

Thank you

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