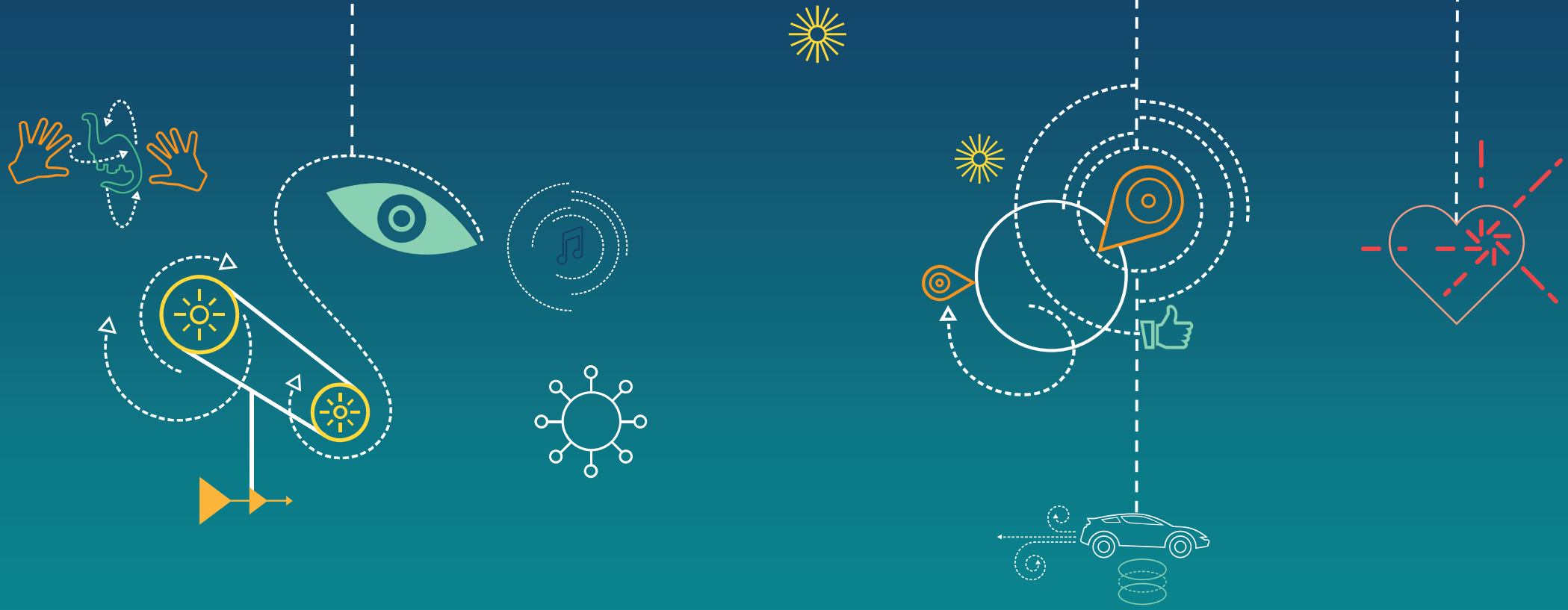

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Dr. Bienvenu AGBOKPONTO SOGLO
Gov't Affairs Director, West & Central Africa

Discussions on the Future of IMT Systems in the UHF Band in Africa : Digital Dividend and WRC-15

FORUM on Future of UHF in Africa, RRS-13-Africa,
16- 20 September 2013, Yaoundé, Cameroon

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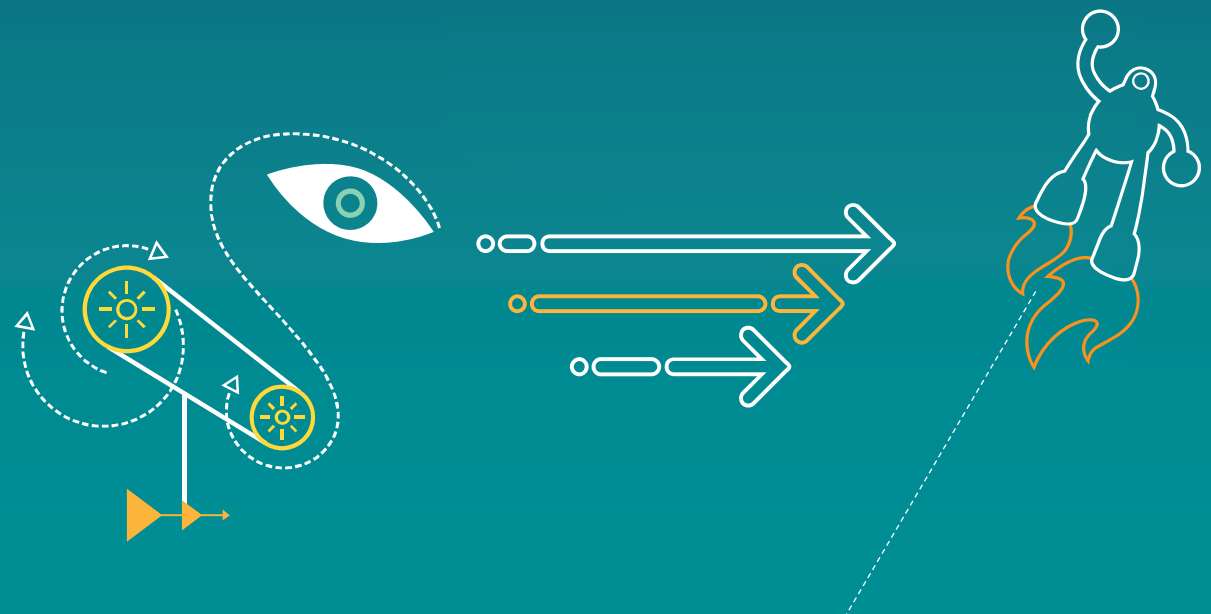


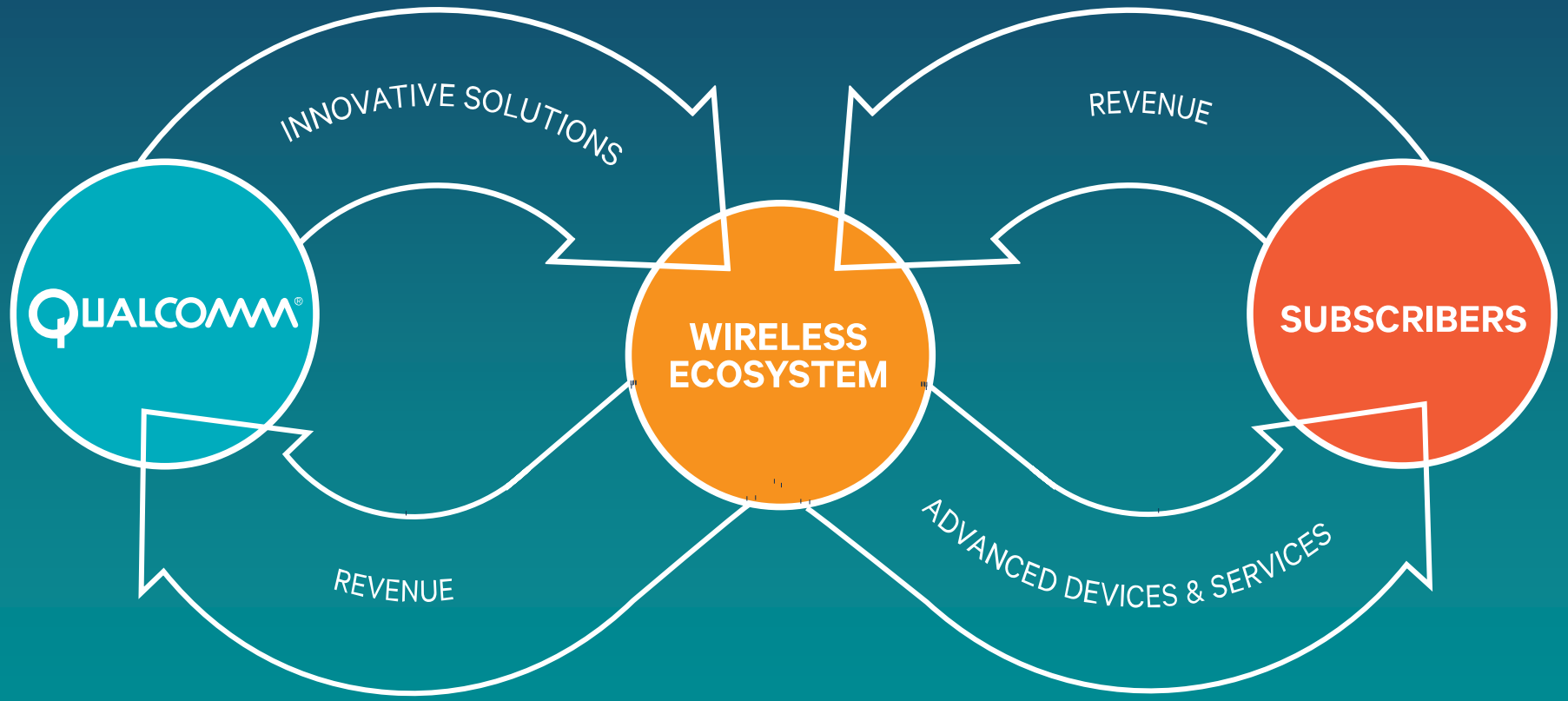
Agenda

1. Introduction to QUALCOMM
2. Challenges and Opportunities for IMT Systems in the UHF Band in Africa
3. Handbook on Global Trend in IMT
4. Conclusion and Recommendations

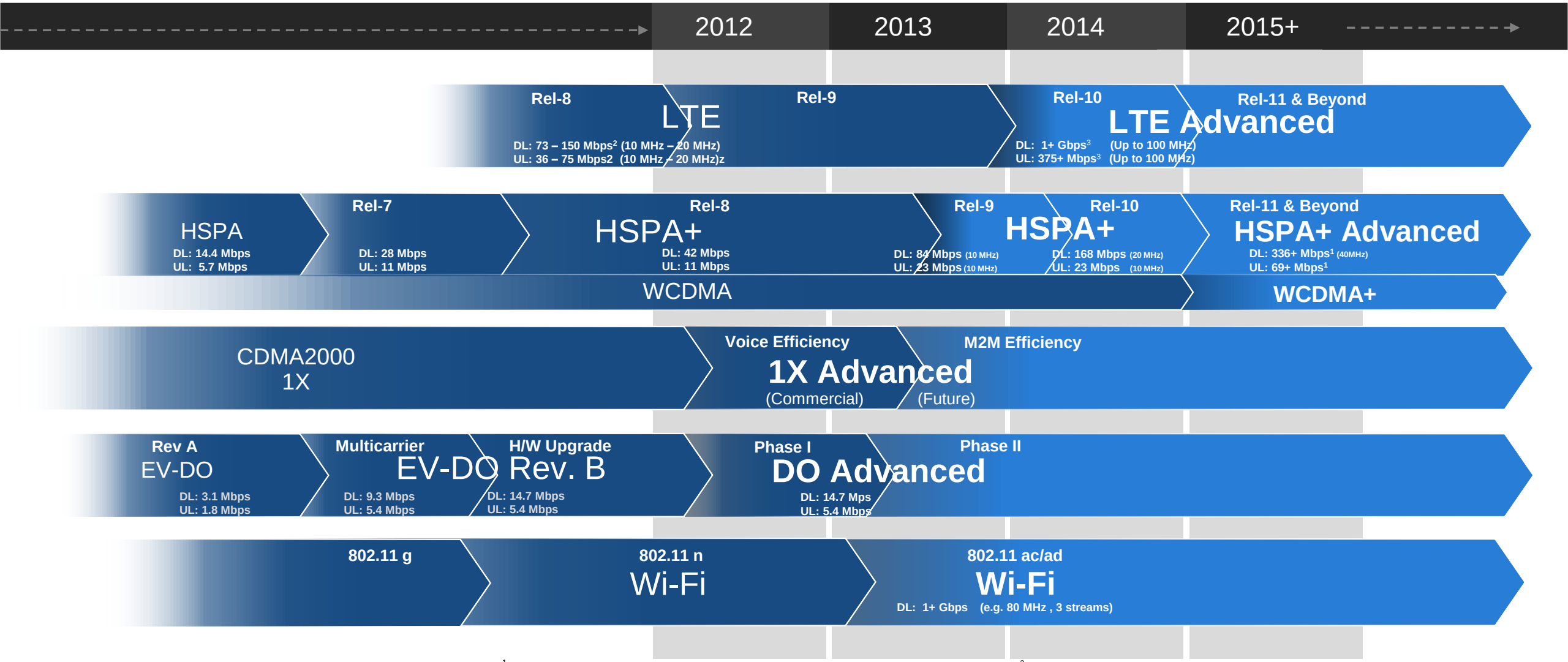
We are mobile natives.

- Celebrating more than 25 years of driving the evolution of wireless communications
- Making wireless more personal, affordable and accessible to people everywhere
- World's largest fabless semiconductor company, #1 in wireless
- S&P 100/ S&P 500/ Fortune 500

A model for mobile innovation



Qualcomm is a leader in Wireless



Commercial

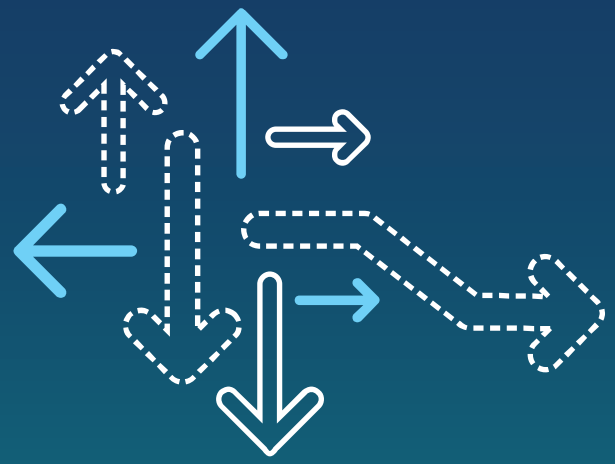
Note: Estimated commercial dates.

[1]R11 expands multicarrier to 40 MHz to reach up to 336 Mbps, Uplink 2x2 MIMO and 64QAM takes uplink to 69Mbps, [2]Peak rates for 10 and 20 MHz FDD using 2x2 MIMO, standard supports 4x4 MIMO enabling peak rates of 300 Mbps. Peak data rates takes overhead into account, per standards 172 Mbps is achievable in 20 Mhz. [3]Peak rates can exceed 300 Mbps by aggregating multiple 20 MHz carriers planned for LTE Advanced (LTE Rel-10). Peak data rate can exceed 1 Gbps using 4x4 MIMO and at least 80 MHz of spectrum

Created 04/18/2012

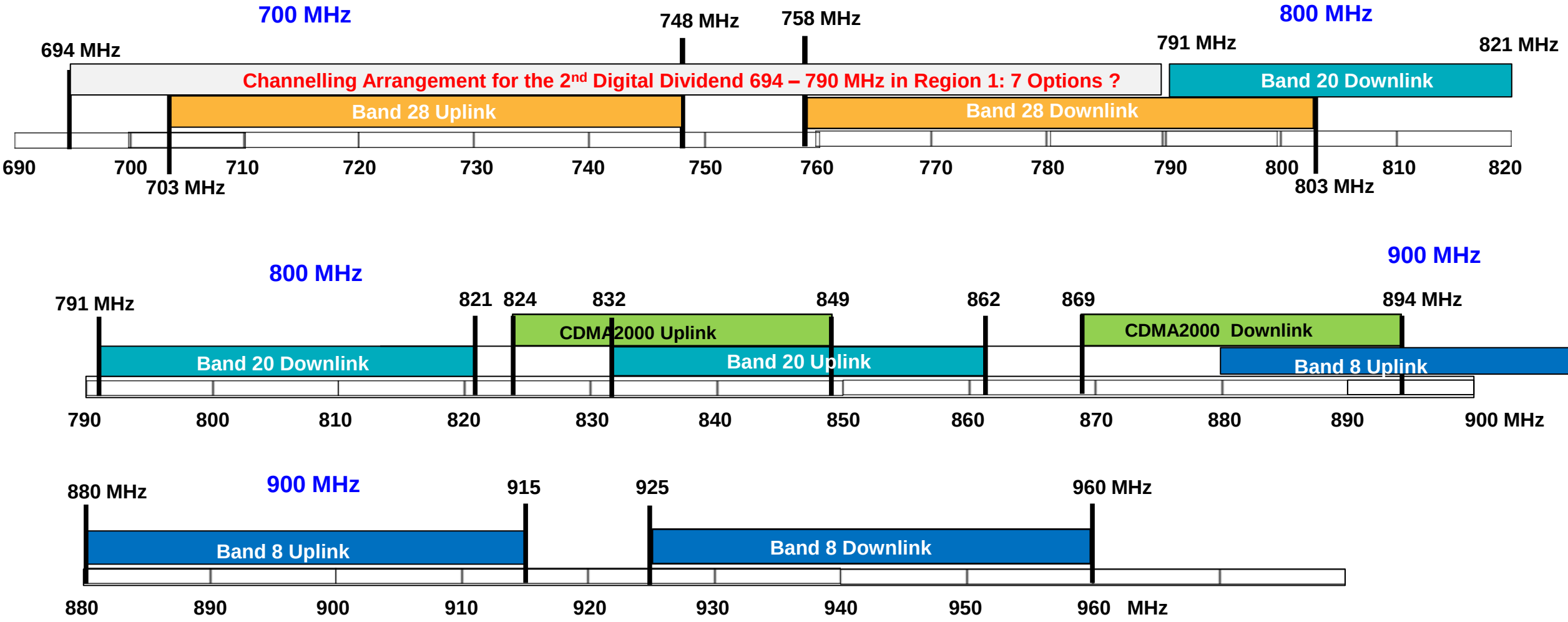
2

Challenges and Opportunities for IMT Systems in the UHF Band in Africa



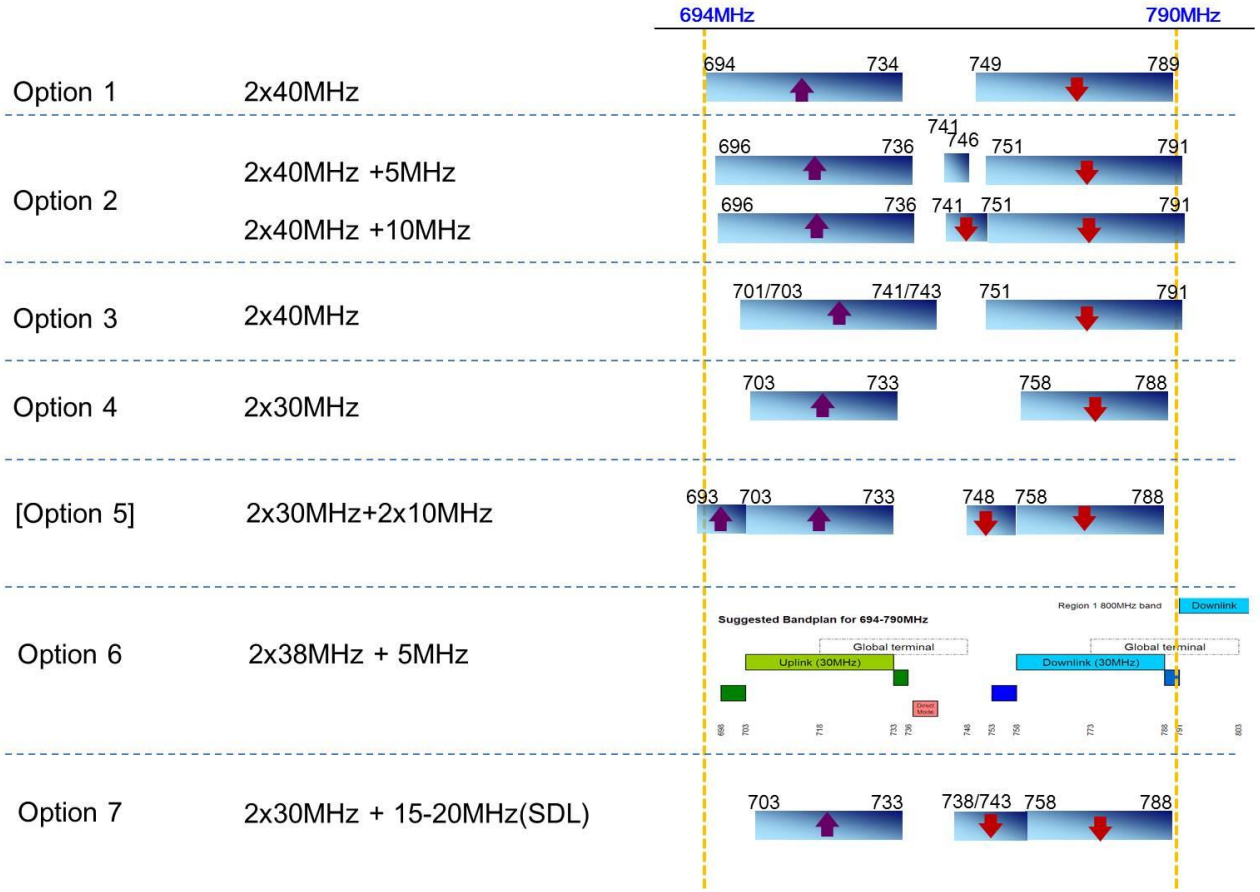
Harmonization of Channelling Arrangements in the UHF Band

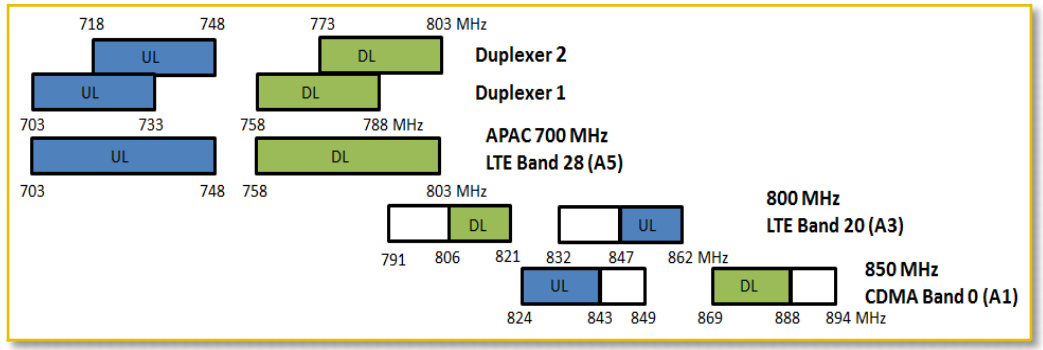
Channelling Arrangement for the 2nd Digital Dividend 694 – 790 MHz in Region 1



Harmonization of Channelling Arrangements for band 694-790MHz

Channelling Arrangement for the 2nd Digital Dividend in Region 1 : 7 Options





2x45 (Band 28) + 2x15 (Band 20)

- Source: Attachment 4.6, WP 5D Chairman's report 5D/441 (10-17 July 2013, Sapporo, Japan)

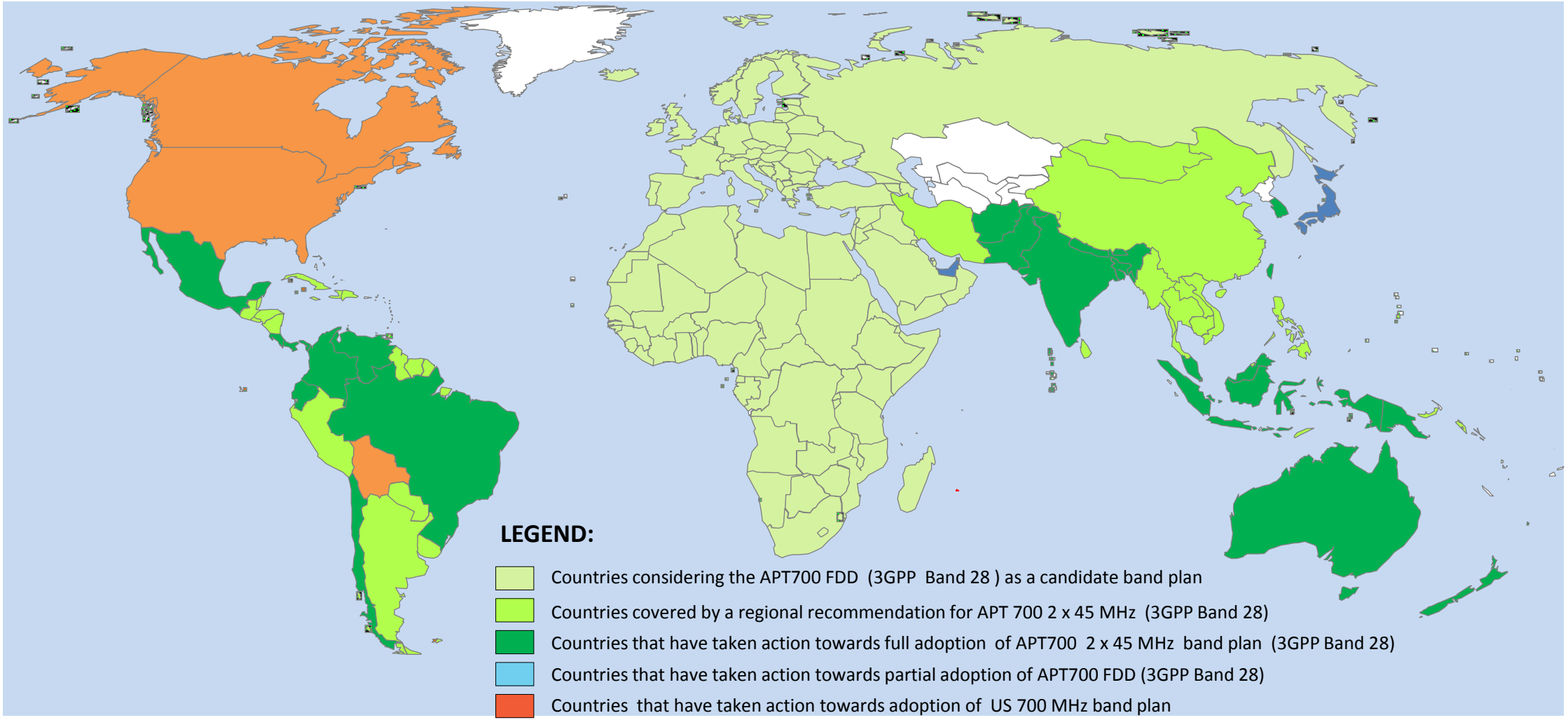
Harmonization of Channelling Arrangements for band 694-790MHz

OOBE Limit required for Mobile Equipment Operating at the 694 Boundary

- Many African countries are studying the possibility of harmonizing the 2nd Digital dividend channelling Plan in Region 1 with full/partial APT 700 (3GPP Band 28) Band Plan
  - Allows operators and consumers to take advantage of the large economies of scale
  - Low cost coverage, and affordable devices
- Additional work needs to be done to ensure that regulatory and technical conditions are harmonized with the 3GPP Band 28
  - E.g. unwanted emission to protect digital TV receiver, is currently subject to discussions in Europe and at the ITU level under the WRC-15 preparation process in the JTG
  - One of the major issue is to develop an appropriate UE unwanted emission requirement for the 700 MHz band in Region 1
- To achieve harmonization with 3GPP Band 28, the same IMT UE OOBE requirement (-25dBm/8MHz) should be adopted for the 700 MHz in Region 1
  - The JTG to finalize sharing/compatibility studies between IMT uplink and DTT receivers around 694 MHz by its February 2014 Meeting: e.g. Decision on OOBE limits and Guard Band

Status of the APT 700 (3GPP Band 28) band plan

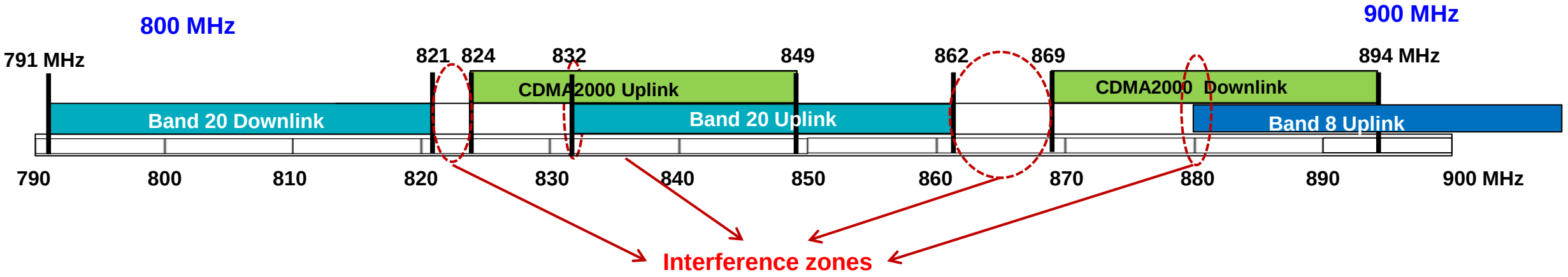
Map



Source: Qualcomm, Inc. Information presented is current as of 7th June 2013 and subject to change

Coexistence issues between different IMT systems in the UHF Band

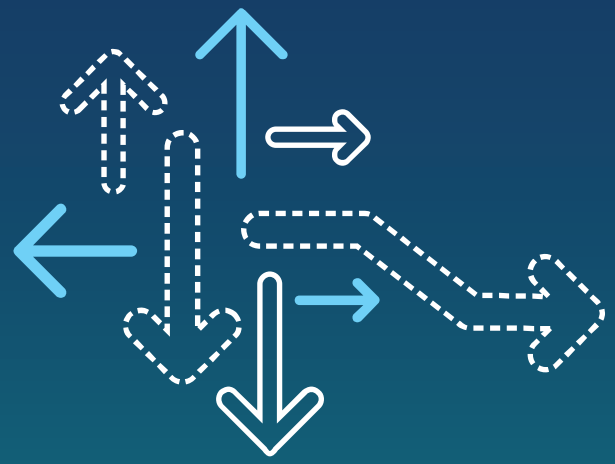
CDMA850/LTE800 and CDMA850/UMTS900 (GSM) Interference Issues



- Co-existence studies between CDMA850 and LTE 800 is being handled at the ITU-R WP 5D
- Three potential interference zones between LTE 800 and CDMA 850 MHz bands
  - Interference issues near 821-824 MHz boundary between LTE 800 MHz band downlink and CDMA 850 MHz band uplink
  - Interference issues near 832/844 MHz boundary between CDMA 850 MHz band uplink and LTE 800 MHz band uplink
  - Interference issues near 862-869 MHz boundary between LTE 800 MHz band uplink and CDMA 850 MHz band downlink
- There are existing reports on the CDMA850 and GSM/UMTS900 interference issues
  - CDMA BTS Tx may affect GSM BTS/UMTS Node-B Rx
  - GSM MS/ UMTS UE Tx may affect CDMA MS Rx

3

Handbook on Global Trend in IMT



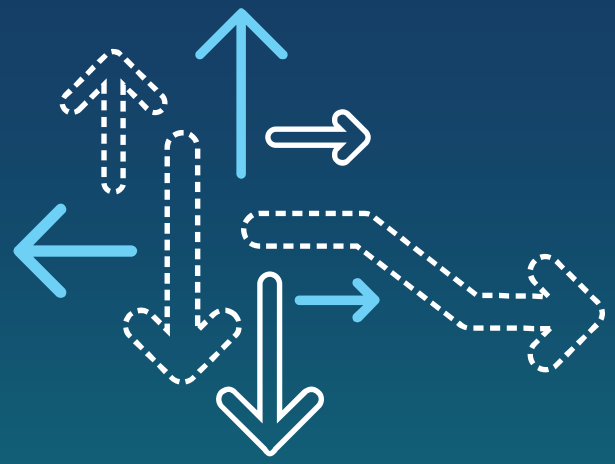
Handbook on Global Trend in IMT

Purpose, Scope and Focus

- Working Party 5D (Sub-Working Group IMT Handbook)
  - Working document towards a Handbook on global trends in IMT – M.[IMT.HANDBOOK]
  - Detailed Workplan (October 2014 completion date)
- Provide general guidance to ITU Members, network operators and other relevant parties on issues related to the deployment of IMT systems to facilitate decisions on selection of options and strategies for introduction of their IMT-2000 and IMT-Advanced networks
- A collaborative effort involving groups in the three ITU Sectors with WP 5D assuming the lead and coordinating role and responsible for developing text for the terrestrial aspects
- Special attention would be given to needs of developing countries responding to the first part of Question ITU-R 77/5
- Focus on the technical, operational and spectrum related aspects of IMT systems, including information on the deployment and technical characteristics of IMT as well as the services and applications supported by IMT
- Includes summary of deliverables and on-going activities of ITU-R on Terrestrial IMT in order to provide an update for countries which are not able to attend WP 5D meetings.

4

Conclusion and Recommendations



Conclusion and Recommendations

- With new digital dividend bands (3GPP Band 20 & Band 28), many African countries are going to have a combination of technologies due to the presence of CDMA in the 850 MHz band, and GSM/UMTS in the 900 MHz band
  - This provides an opportunity to optimize the existing networks, while allowing evolution/introduction to/of LTE in the UHF Band (694-862MHz)
  - Co-existence studies of IMT Systems in the UHF band is being handled at the ITU-R WP 5D
  - African countries could consider a stakeholder consultation on the coexistence/interference issues between LTE & CDMA operators around 800 MHz in order to provide guidelines on interference mitigation as well as look at the regulatory aspect of this coexistence issue
- Harmonization of channelling arrangements in the UHF band
  - WP 5D is examining the channelling plan for the 700MHz (694-790/862)
    - Various channelling arrangements are under consideration within WP 5D (ITU-R M.[IMT.ARRANGEMENTS])
    - APT 700 MHz (3GPP Band 28) Band plan adoption is gaining momentum in Asia and Latin America
  - The JTG to finalize sharing/compatibility studies between IMT uplink and DTT receivers around 694 MHz by its February 2014 Meeting
    - To achieve harmonization with 3GPP Band 28, additional work needs to be done to ensure that regulatory and technical conditions are harmonized, e.g. OOBE emission limit

Conclusion and Recommendations (Cont.)

- Closely follow and contribute to the development of the Handbook on global trend in IMT
  - Special attention would be given to needs of developing countries
  - October 2014 completion date
- Qualcomm is open to continuing dialogue with African Regulators on these important topics and other topics of interest

Thank you

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