QUALCOMM

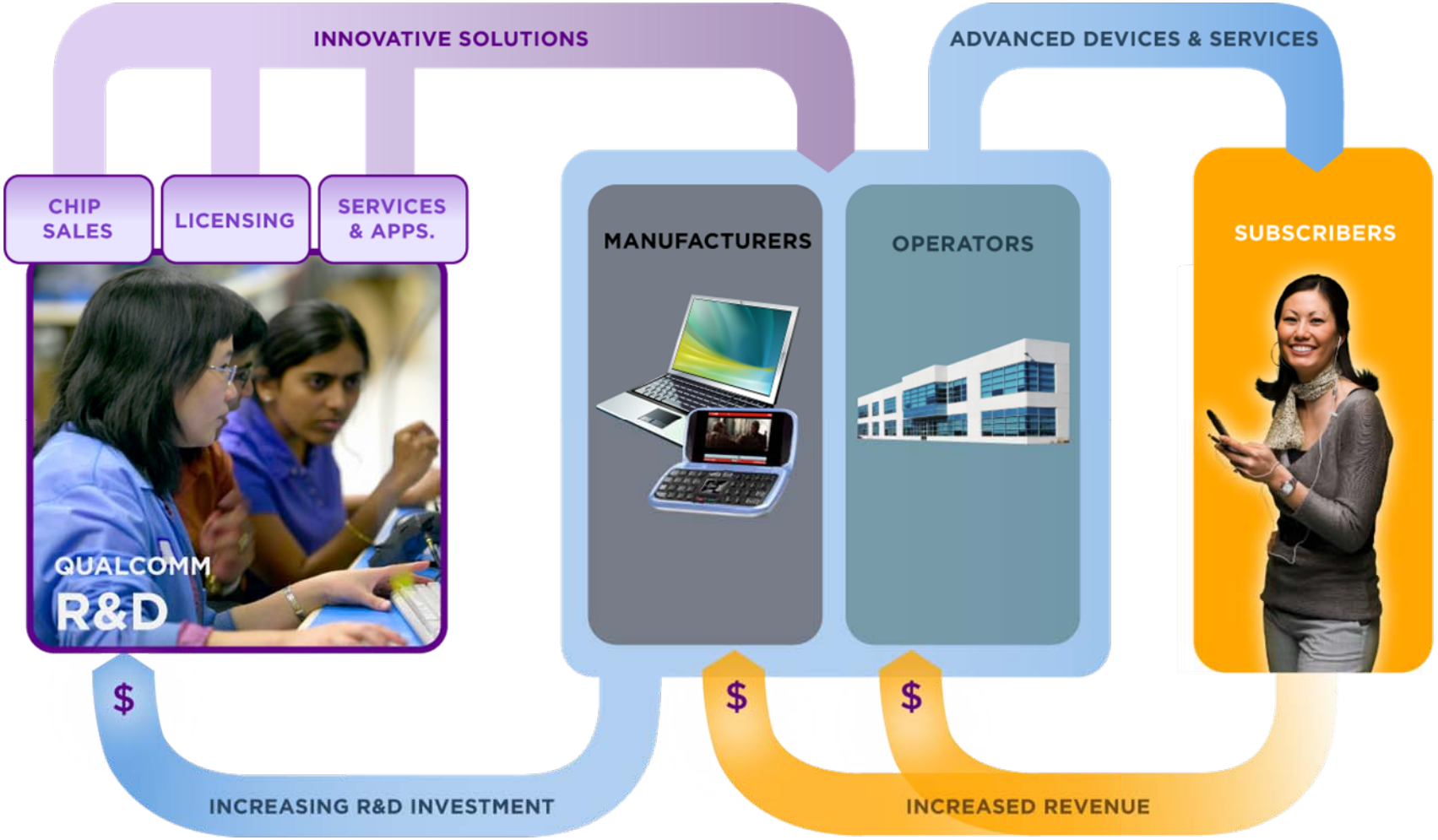
Encouraging Wide Scale Deployment of Broadband

Policy and Regulatory Considerations

ITU-D Regional Development Forum for Africa Region

Contents

Qualcomm Business Model: Technology and Value Chain Enabler



3G Offers Excellent Mobile Broadband Today

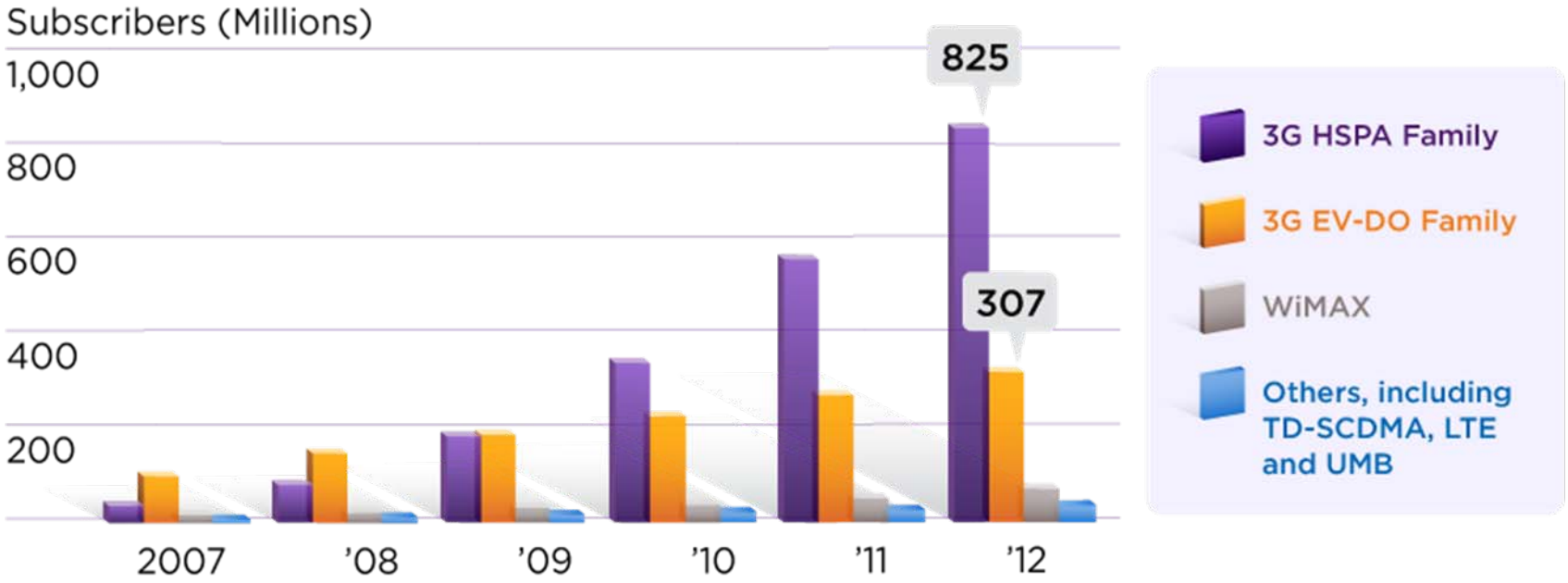
>525 Commercial Networks:

>106 EV-DO (59 Rev. A)
>268 CDMA2000 1X

>247 HSDPA (>66 HSUPA)
>264 WCDMA

Source: CDG and GSA (as of Feb'09) (Subscribers): Wireless Intelligence as of Feb'09. Mobile Broadband includes estimated EV-DO and HSPA mobile subscribers

3G Will Drive Mobile Broadband Connections Into the Next Decade



3G will command **92%** of the Mobile Broadband market in 2012

Sources: Strategy Analytics, July 2007; Informa, September 2007.
HSPA Family includes HSDPA, HSUPA & HSPA+. EV-DO Family includes Rel. 0, Rev. A and Rev. B.

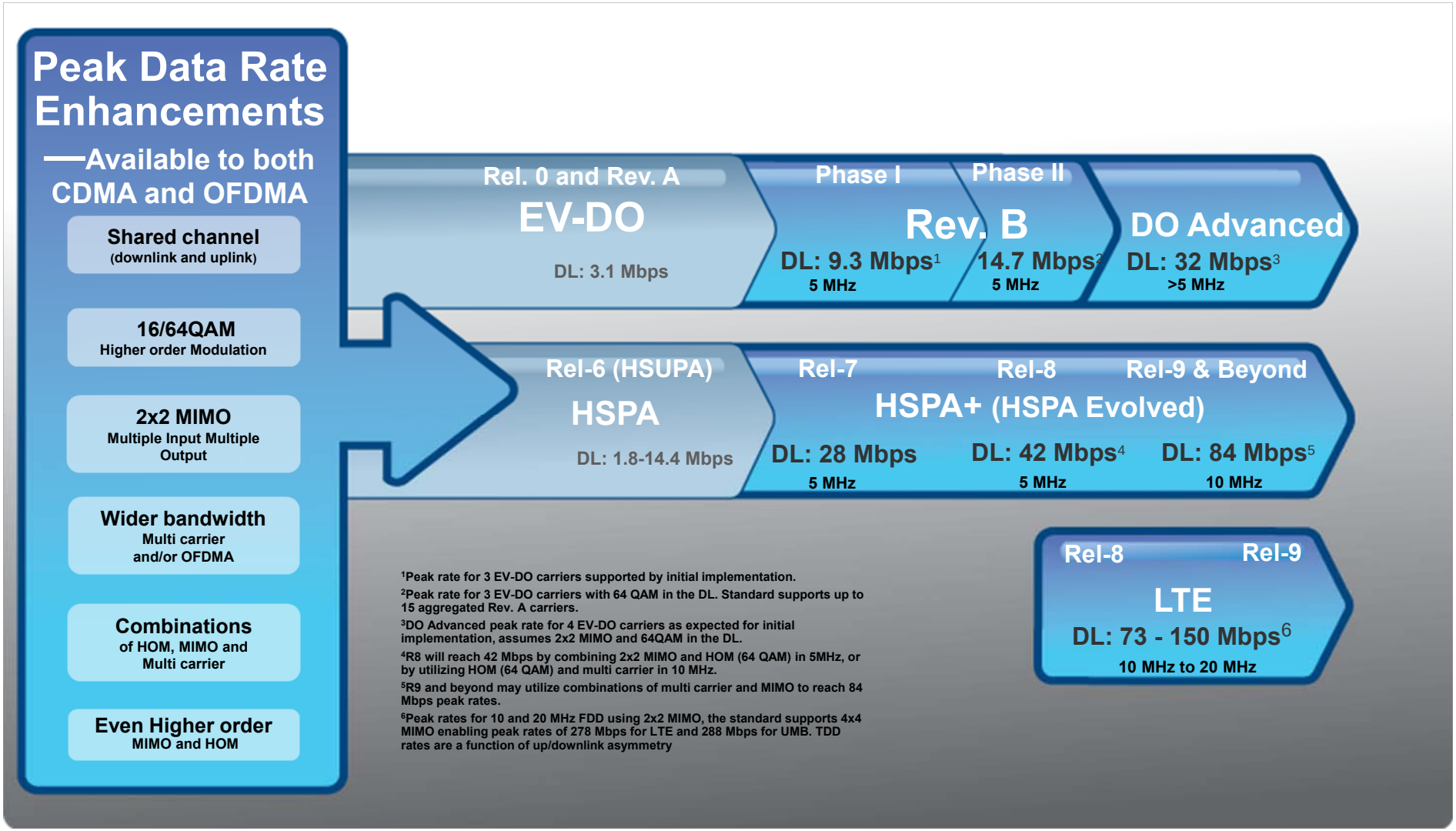
Evolution of Mobile Services

User trends shift from wired to wireless

Simple Communication	Download	Download & Upload	Real-Time Delay Sensitivity	Seamless Fixed Mobile Convergence
Voice & Text	**Streaming**	**User Generated Content**	**Rich Communication**	**Seamless Connectivity**
• Voice • SMS/Email	• Music/Ringtones • Video • Web Browsing	• Mobile 2.0 • Social Networking • Media Sharing • Collaboration • Mobile Advertising	• VoIP • PTT/PTM • Video Communication • Multiplayer Gaming	• IPTV • Home Network • Set Top Box • Ubiquitous Broadband • Consumer Electronics • Video Surveillance

Mobile Services becoming center of life

Peak Data Rates Scales with Bandwidth —Achievable in Optimal Conditions



Licensing Considerations

- **Enabling Policies & Regulations:**
  - **Investment opportunities- profitability**
    - Technology Neutrality
    - Service Neutrality (fixed vs. mobility, voice, data, etc)
  - **Healthy competition**
    - Avoid fragmentation
  - **Consumer Protection**
  - **Universal access/services**
    - Appropriate solutions for all consumers
    - All market segments
    - All geographical regions(urban and rural)
  - **Management of Scarce Resources(Spectrum , Numbering etc)**

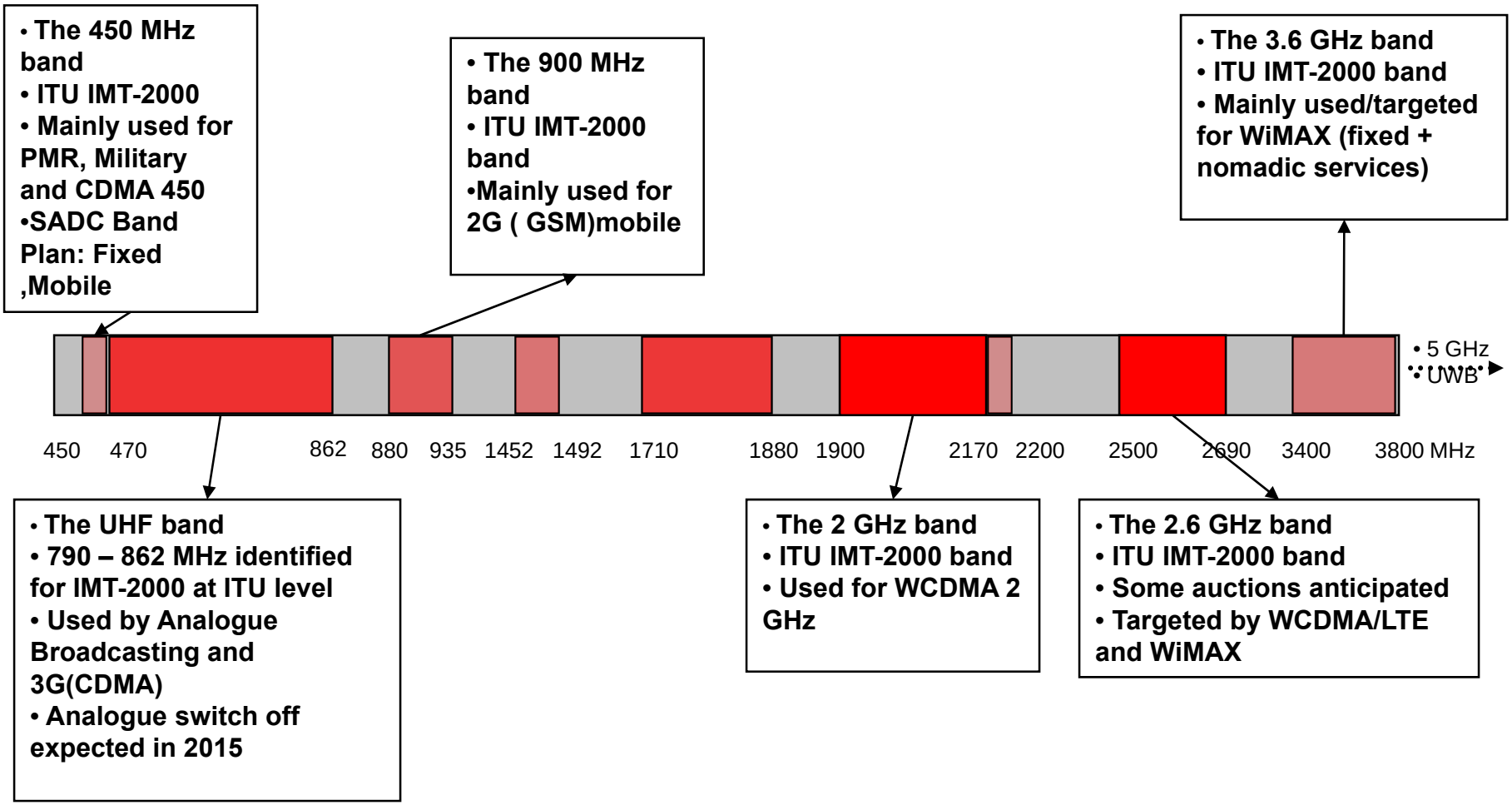
Frequency Spectrum Considerations(1)

- **Frequency Arrangements in IMT Bands**
  - **Contained in Rec. ITU-R M.1036-3 :**
  - **806-960MHz**
    - 824-849/869-894 MHz (A1)
    - 880-915/925-960 MHz (A2)
  - **1710-2025MHz and 2110-2200 MHz**
    - 1920-1980/2110-2170 MHz (B1)
  - **2500- 2690 MHz**
    - 2500-2570/2620-2690(Centre Gap TDD(C1), FDD DL(C2)
    - 2500-2690 Flexible FDD/TDD (C3)

Frequency Spectrum Considerations (2)

- **Additional Bands identified at WRC 07:**
  - **450-470 MHz ; 698-960 MHz; 2300-2400MHz; 3400-3600 MHz**
- **Revision of Rec. ITU-R M.1036-3 on going in WP 5D**
  - **Next meeting June 2009**
  - **Regional harmonization discussions ongoing(698-960MHz):**
    - USA completed 700 MHz Band Plan, most spectrum assigned via auction
    - Europe in advanced stages of harmonizing 790-862 MHz
    - Region 3 initiated discussions on options; completion 2H 2010
    - Which Way Africa?

Opportunities in Africa(1)



Opportunities in Africa (2)

- 450 MHz Band
  - CDMA 450 gaining momentum, creating a global presence
  - Excellent propagation ; rural coverage
  - 110 CDMA 450 devices in market
- The UHF Band (790-862 MHz)
  - WRC 07 MOBILE Allocation championed by Africa
  - Most African countries have allocation starting 2007 through footnotes
    - 316;316A;
  - Spectrum may be released for wireless after analogue switch off
    - Relieve constraints on the 824-849/869-894 MHz band
    - Avail 72 MHz for IMT
    - JTG 5-6 Studies

WRC-11 Agenda item 1.17 (1)

- 1.17: to consider results of sharing studies between the mobile service and other services in the band 790-862 MHz in Regions 1 and 3, in accordance with Resolution 749 (WRC-07), to ensure the adequate protection of services to which this frequency band is allocated, and take appropriate action

- Resolution 749 (WRC-07)

  emphasizing

  a) **The use of 470-862 MHz by broadcasting and other primary services, covered by the GE06 Agreement**

  b) **Requirements of other services including mobile and broadcasting services**

  resolves

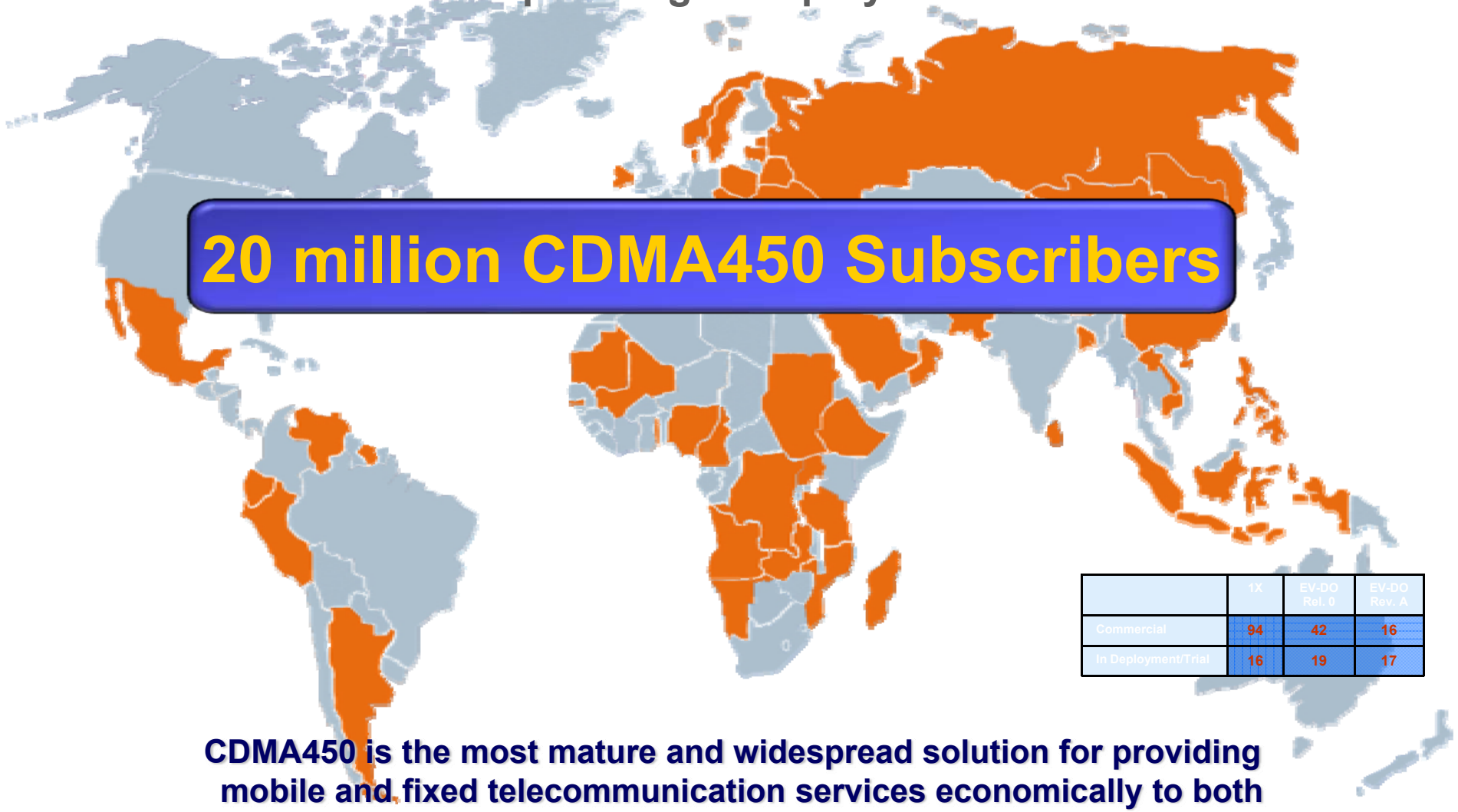
  1. **Sharing studies for Region 1 & Region 3 in 790-862 MHz between mobile and other services**
  2. **ITU-R report of study results to WRC-11**

→ To study this agenda, the 1st CPM meeting established JTG5-6 in ITU-R

CDMA450: Optimizing Mobile Communications

CDMA450 is gaining momentum while creating a global presence

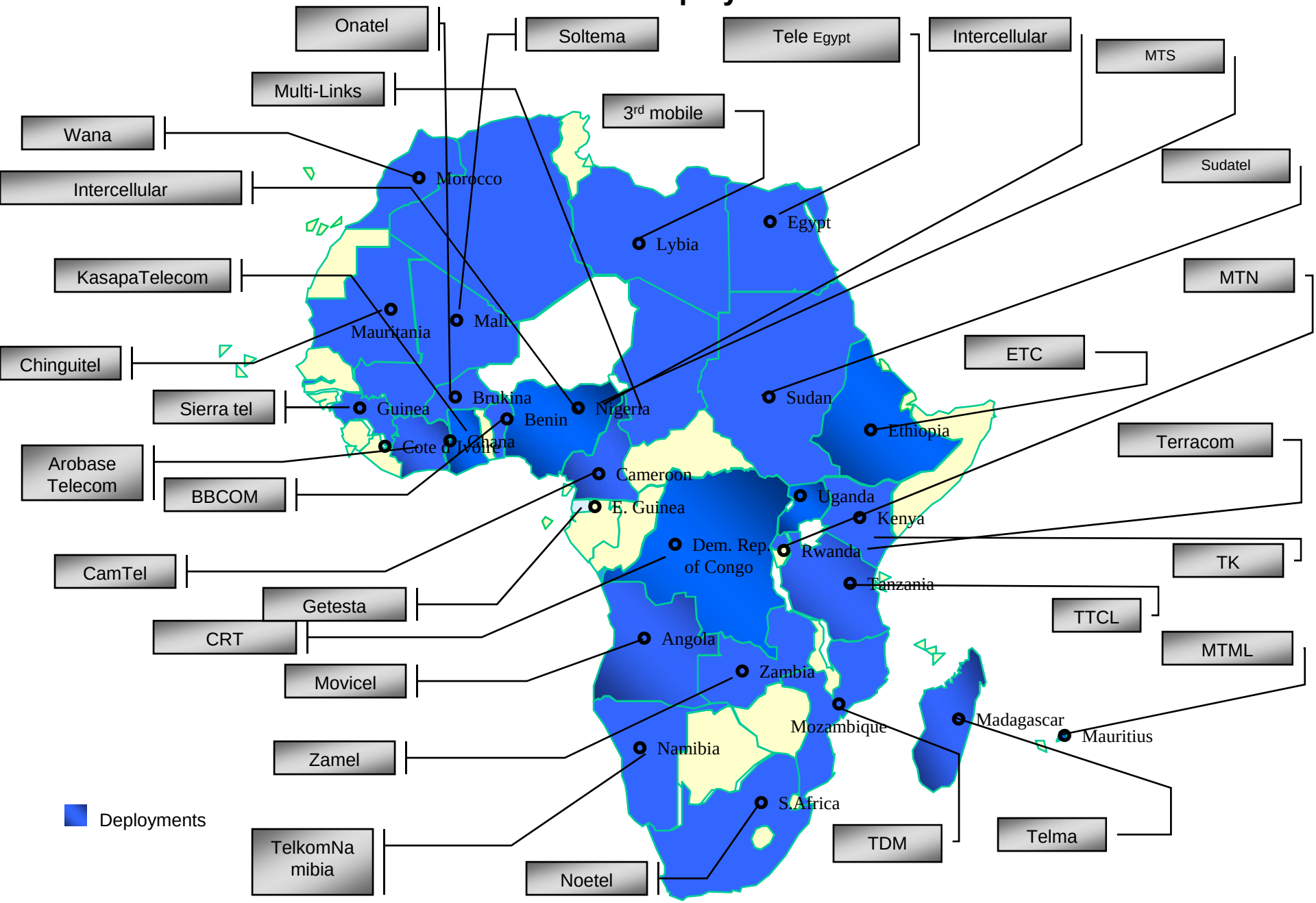
Up to 125 operators in over 65 countries have deployed or are planning to deploy CDMA450



	1X	EV-DO Rel. 0	EV-DO Rev. A
Commercial	94	42	16
In Deployment/Trial	16	19	17

CDMA450 is the most mature and widespread solution for providing mobile and fixed telecommunication services economically to both urban and underserved rural markets

800 MHz Current Deployments



Opportunities in Africa(3)

- 900 MHz Band
  - Operators have shown interest in using the 900 MHz band to provide better coverage
  - 7 Commercial networks(Finland, Thailand, Australia, Iceland)
  - Cost savings for radio infrastructure
  - Wide portfolio of devices available today with interoperability with WCDMA 2100 and GSM 900/1800
  - Transition from 2G to 3G in the same bands allowed by ITU and most national regulators
  - UMTS900 complements UMTS Core band deployments and allows to use the same sites as for GSM

Opportunities in Africa (4)

- 2.6 GHz Band
  - Auctions have started / anticipated in other regions
  - Selection of bandplan(C1, C2 or C3) should be cognisant of econmies of scale.
  - Avoid technology specific assignments.
- Digital Dividend Beyond Analogue Switch Off ?
  - Will DTV utilize the entire 470-790 MHz in all countries?
  - Some countries have no/very few UHF TV assignments
  - Assesment of ACTUAL Broadcasting needs

Summary

3G offers Excellent Mobile Broadband Today

3G has a Strong Evolution Path

LTE is a parallel Evolution Path to 3G

Opportunities to maximize IMT spectrum

Wide scale broadband deployment achievable

Thank You!

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