



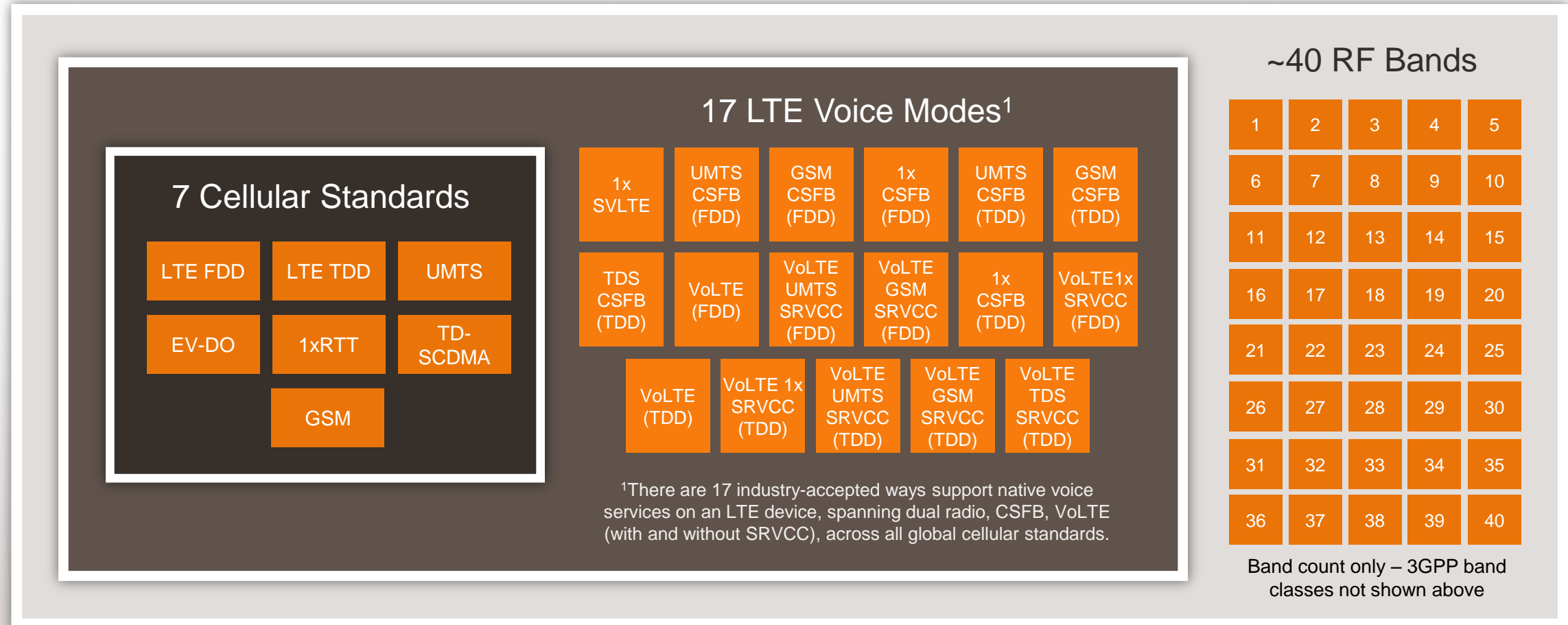
Solving the Global LTE Multimode and Multiband Challenge

4G World
October 2012



Global LTE Devices Start with Cellular Multimode

Gobi Multimode Integration Enables Global Reach and Seamless Mobility



Source: Qualcomm Technologies, Inc

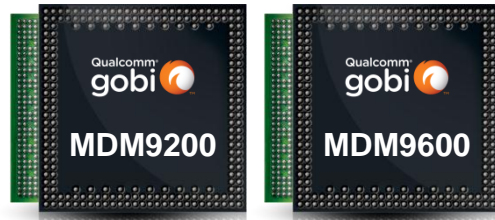
100% Gobi Support

Leading LTE Technology Portfolio

Already on Third Generation of LTE

First Generation

World's First Integrated
LTE/3G Modem Chips

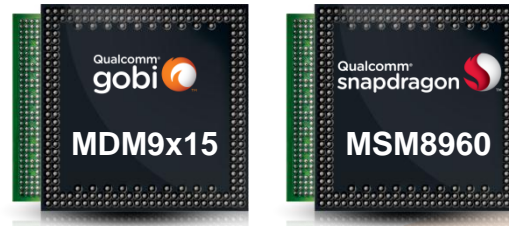


6 modes supported

2010

Second Generation

World's First Mobile Platform (8960)
with integrated LTE/3G Multimode



Supports all 7 global standards

2011–12

Third Generation

World's First Integrated LTE/3G Modem
with Cat4 and Carrier Aggregation

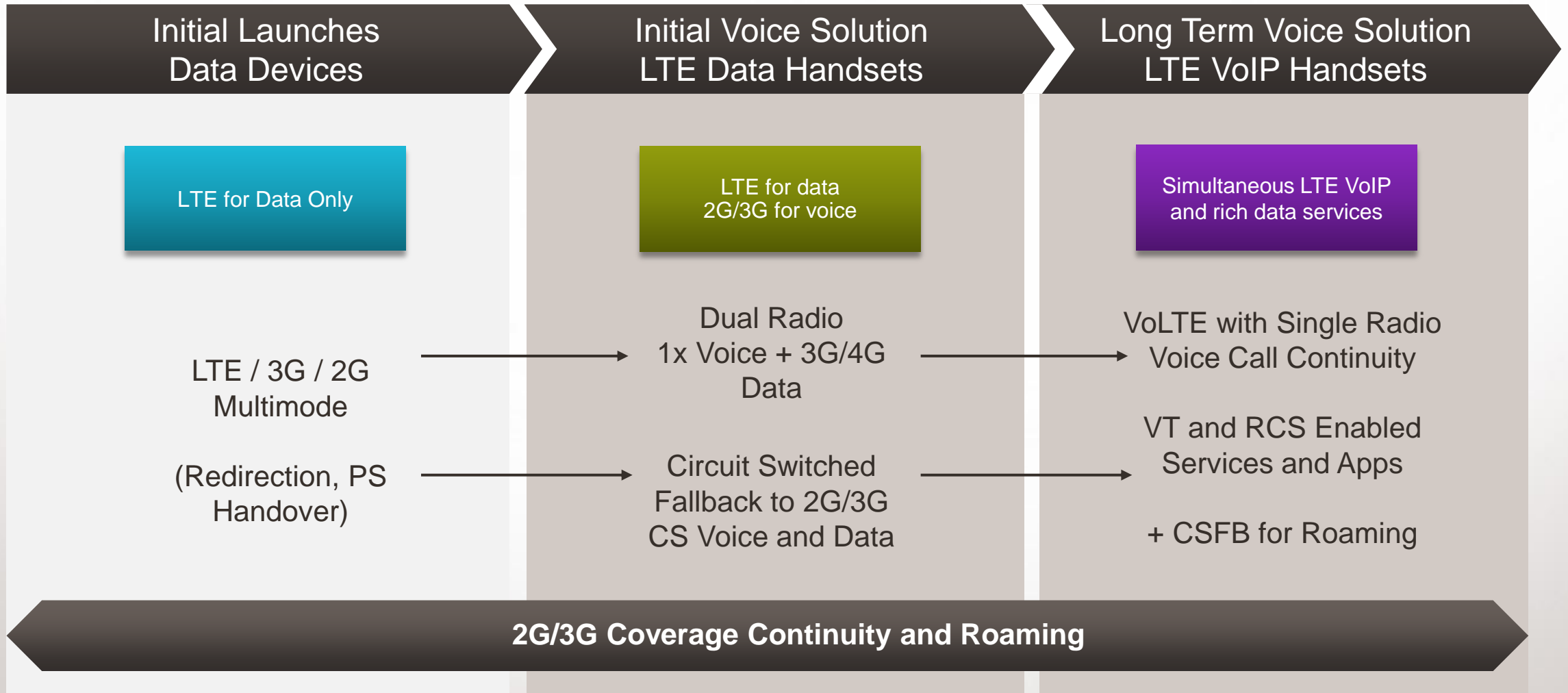


LTE FDD, LTE TDD, UMTS, EV-DO,
CDMA 1x, TD-SCDMA, GSM/EDGE

2013

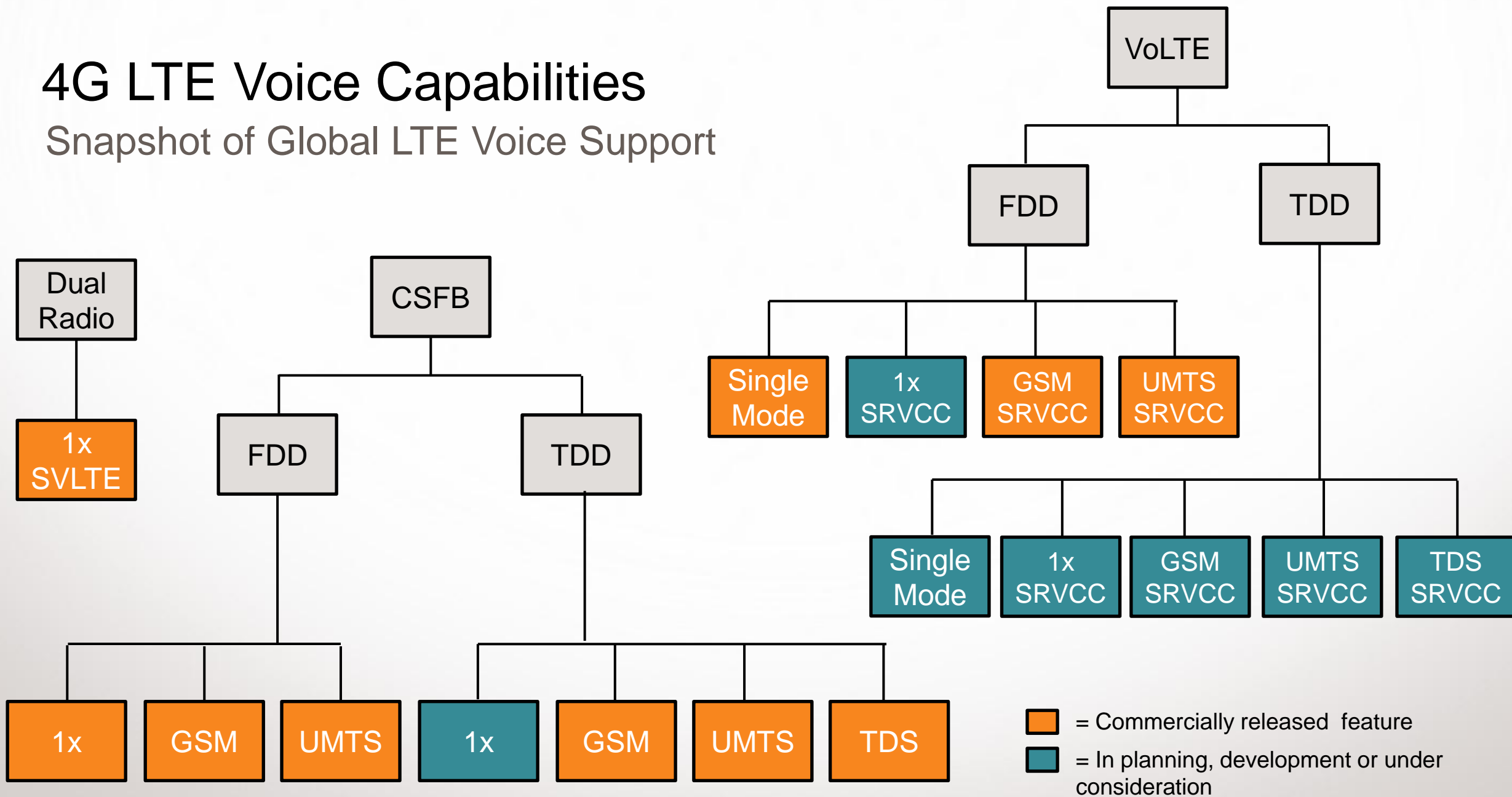
Support of All Modes, All Bands, Performance Evolution

High Level Multimode Options for LTE Voice Support



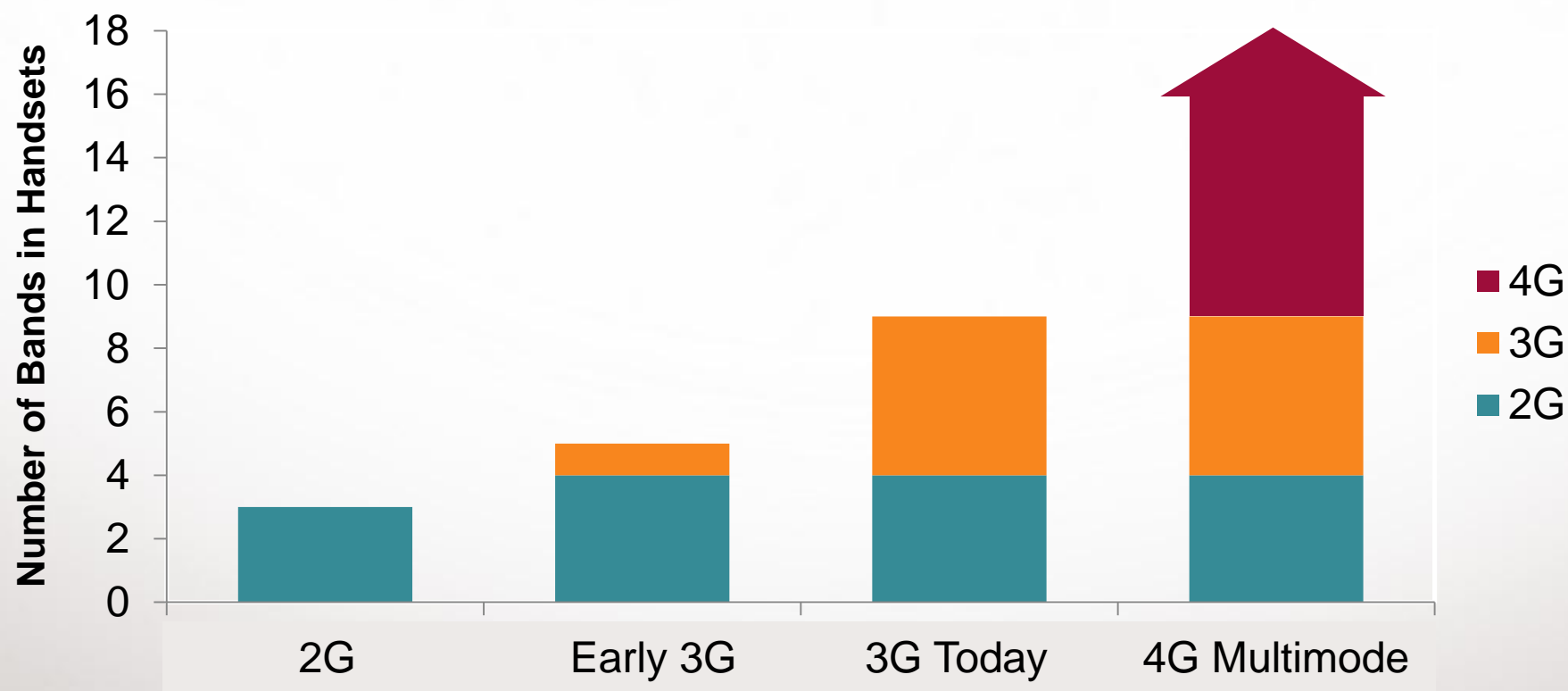
4G LTE Voice Capabilities

Snapshot of Global LTE Voice Support



Handset Radio Frequency Band Trends

Supported by Qualcomm Single Chip RF Solutions



Leading RF solutions from QTI

RF Integration and Footprint Reduction

UMTS/GERAN

→ UMTS/GERAN/1x/DO/LTE

→ All 7 cellular Standards
including TD-SCDMA



Single chip **multimode/multiband**
with integrated RxD and GPS

RTR8600



Single chip **world mode** with integrated
RxD and GPS

WTR1605L

RTR6285

Single chip **multiband/multimode**
with integrated RxD and GPS

2007

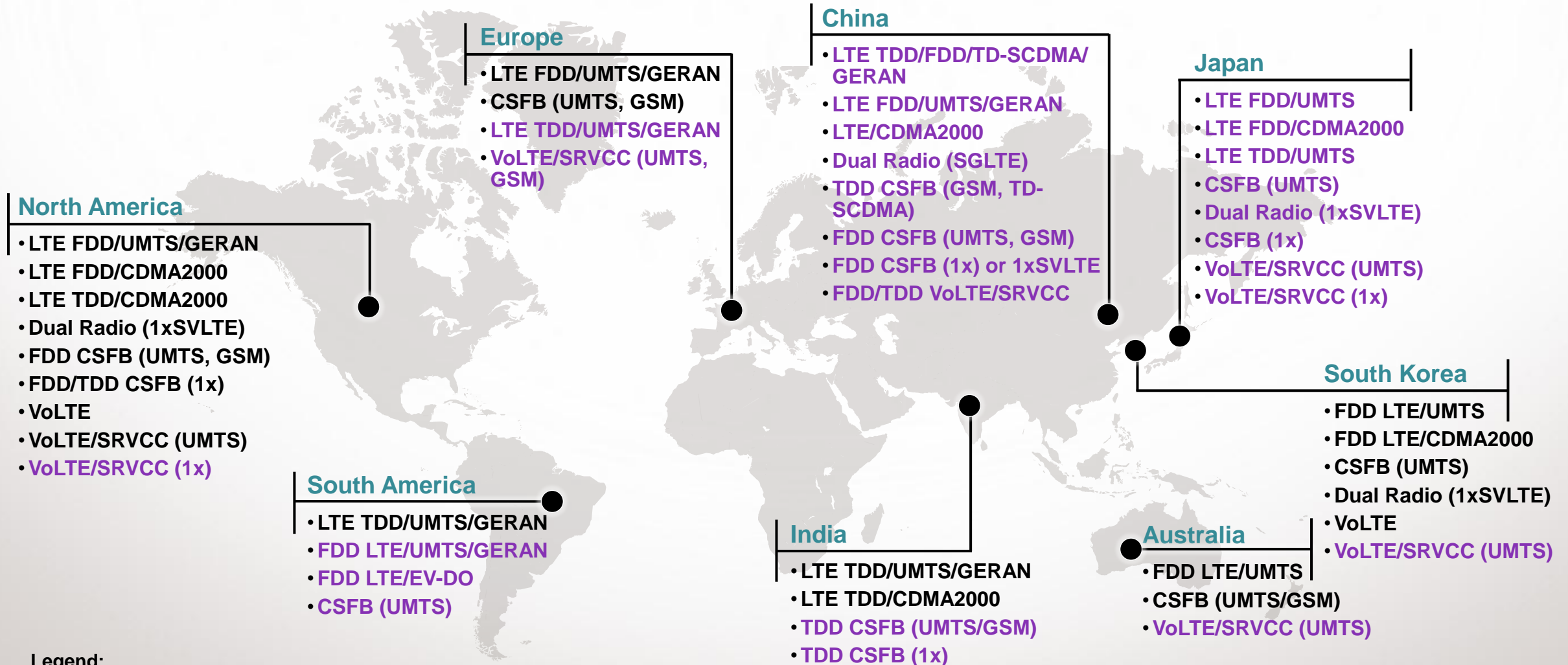
2010

2012

Global LTE Multimode ~40 Bands Required (some examples)



LTE Modes for Data and Voice Services (regional examples)



Legend:

Black text: Known Configurations

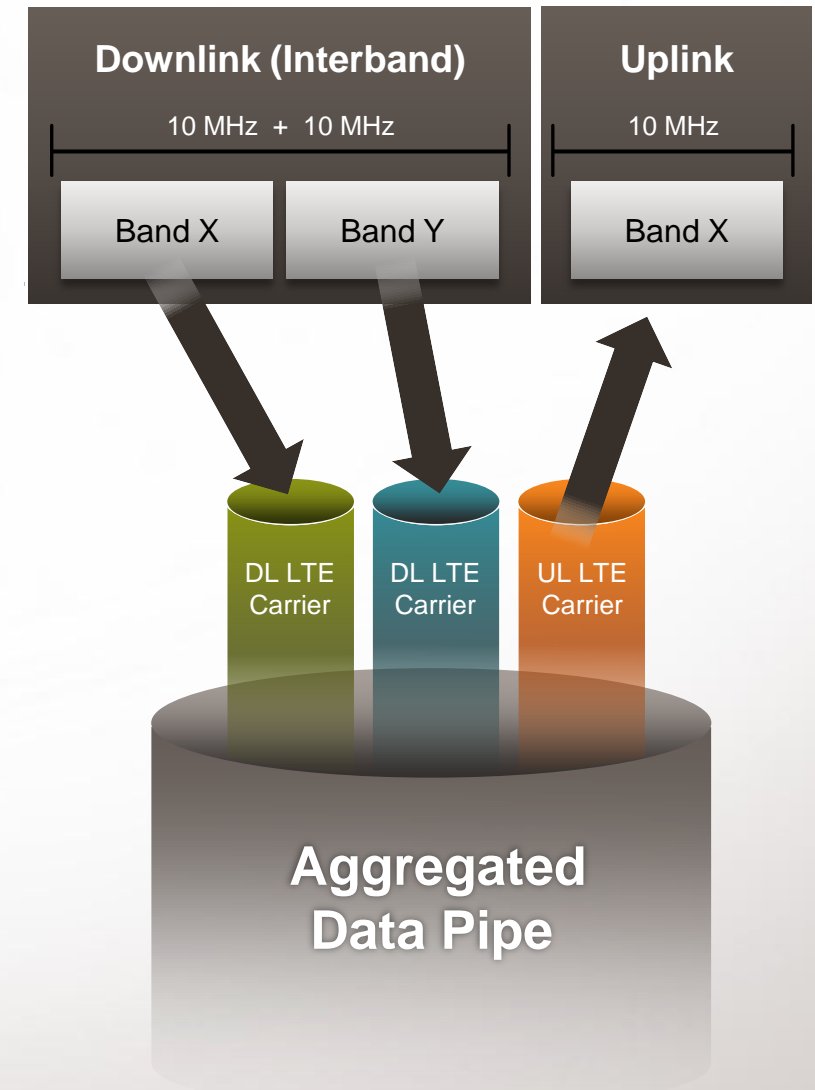
Purple text: Anticipated Configurations

Example combinations shown above. Source: Qualcomm Technologies, Inc.

LTE Advanced: Carrier Aggregation Overview

- Cat4 150 Mbps requires contiguous 20 MHz
- Very few operators have this LTE spectrum asset
- Carrier Aggregation combines fragmented spectrum
- Accelerates LTE migration to 150 Mbps
- Higher peak and average user data rates
- 30+ combinations considered in 3GPP

- Lead chipset (third gen LTE):



LTE Advanced: Carrier Aggregation Combinations

Interband Configurations	Status
Band 1 + Band 5	Completed
Band 3 + Band 7	ongoing
Band 4 + Band 13	ongoing
Band 4 + Band 17	ongoing
Band 20 + Band 7	ongoing
Band 5 + Band 12	ongoing
Band 4 + Band 12	ongoing
SDL + Band 2	ongoing
Band 2 + Band 17	ongoing
Band 4 + Band 5	ongoing
Band 5 + Band 17	ongoing
Band 1 + Band 7	ongoing
Band 3 + Band 5 (DL only)	ongoing
Band 3 + Band 5 (UL and DL)	ongoing
Band 4 + Band 7	ongoing
Band 20 + Band 3	ongoing
Band 20 + Band 8	ongoing
Band 1 + Band 21	ongoing
Band 1 + Band 19	completed
Band 11 + Band 18	ongoing
Band 1 + Band 18	ongoing
Band 3 + Band 8	ongoing
Band 4 + Band 12	New

Intraband	Status
Band 1 (intra-band CA)	Ongoing
Band 40 (intra-band CA)	Ongoing
Band 41 (intra-band CA)	Completed
Band 38 (intra-band CA)	ongoing
Band 7 (intra-band CA)	ongoing
Band 25 (intra-band CA, non contiguous)	ongoing
Band 3 (intra-band CA, non contiguous)	ongoing
Band 4 (intra-band CA, non contiguous)	new
Band 1 (intra-band CA, contiguous)	new

Source: 3GPP

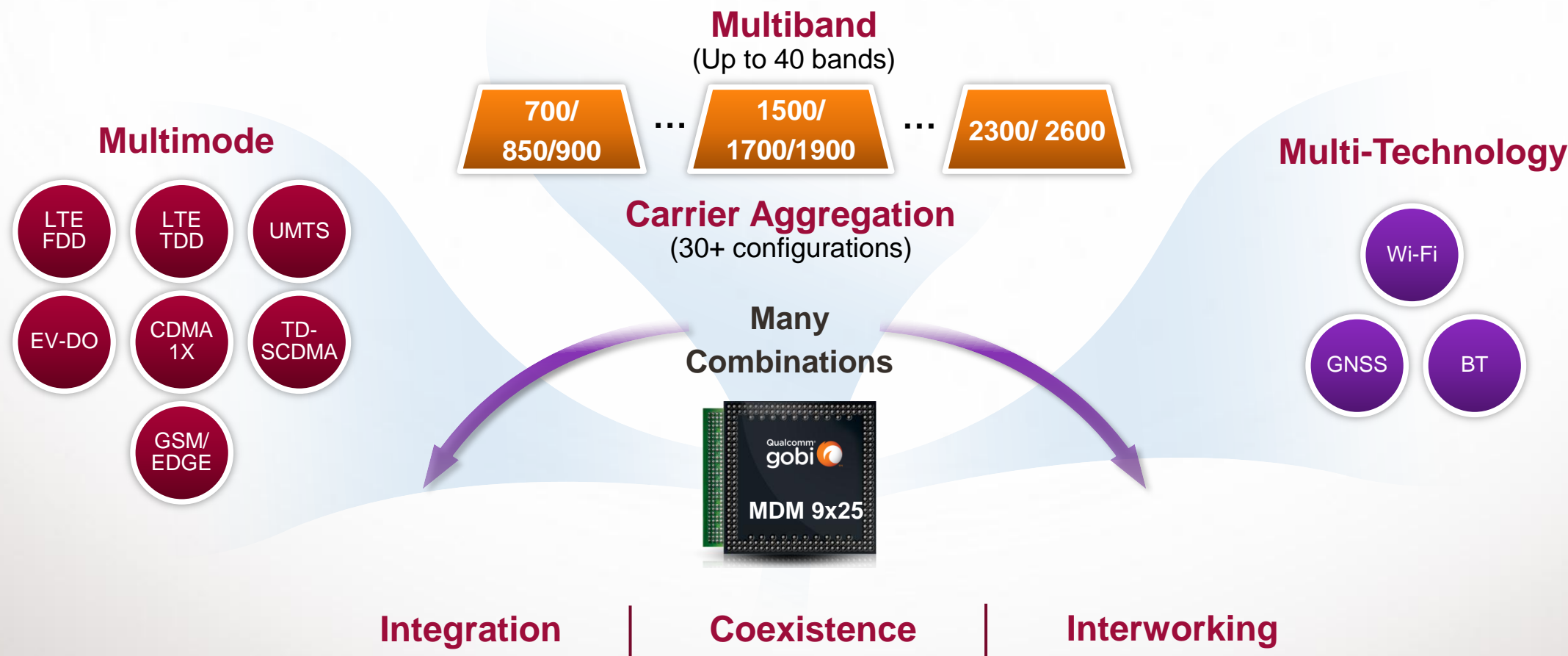
HSPA+ Multicarrier Band Combinations

Combo	Status
Band 2 (4)	Completed
Band 1 (4)	In Process
Band 1 + Band 8 (2+2)	In Process
Band 1 + Band 3 (3+1)	In Process
Band 1 + Band 3 (2+1)	In Process
Band 5 (3)	In Process
Band 1 + Band 3 (2+2)	In Process
Band 1 + Band 11 (2+2)	In Process
Band 2 + Band 4 (3+1)	In Process
Band 9 (3)	In Process
Band 9 (4)	In Process
Band 2 + Band 5 (1+2)	In Process
Band 2 + Band 5 (1+1)	Completed
Band 1 + Band 11 (1+1)	Completed
Band 1 (3)	Completed
Band 1 + Band 5 (1+1, 1+2, 2+1, 2+2)	Completed
Band 2 + Band 4 (1+1, 1+2, 2+1, 2+2)	Completed
Band 1 + Band 8 (1+1, 2+1, 3+1)	Completed

Source: 3GPP

Many Facets of Seamless Mobile Broadband

Integrated Global LTE Multimode Solutions



Seamless Interworking Across Broadest Set of Technologies and Bands

Thank You

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