Sunil Patil
Director, Product Management
Qualcomm Technologies, Inc.

LTE Band Fragmentation

1000x, Spectrum Innovation & Chipset Evolution

- 1:00pm - 1:30pm **The 1000x mobile data challenge**
  Innovations in small cells, spectrum and higher efficiency
- 1:30pm - 2:00pm **What is next for HSPA+?**
  And related evolutions; WCDMA+ and S-UMTS

Speaker: Rasmus Hellberg,
Sr Director, Technical Marketing

- 2:00pm - 2:30pm **What is next for LTE?**
  LTE Advanced, opportunistic HetNets and LTE Direct
- 2:30pm - 3:00pm **What is next for Wi-Fi?**
  The Wi-Fi evolution, its role in 1000x, connected home and new frontiers

Speaker: Prakash Sangam,
Director, Technical Marketing

- 3:00pm - 3:15pm Break
- 3:15pm - 4:00pm **How do we access more spectrum for 1000x?**
  Cleared, Licensed Spectrum (Voluntary Incentive Auction)/Authorized Shared Access (3.5 GHz)/Unlicensed Spectrum (5 GHz)

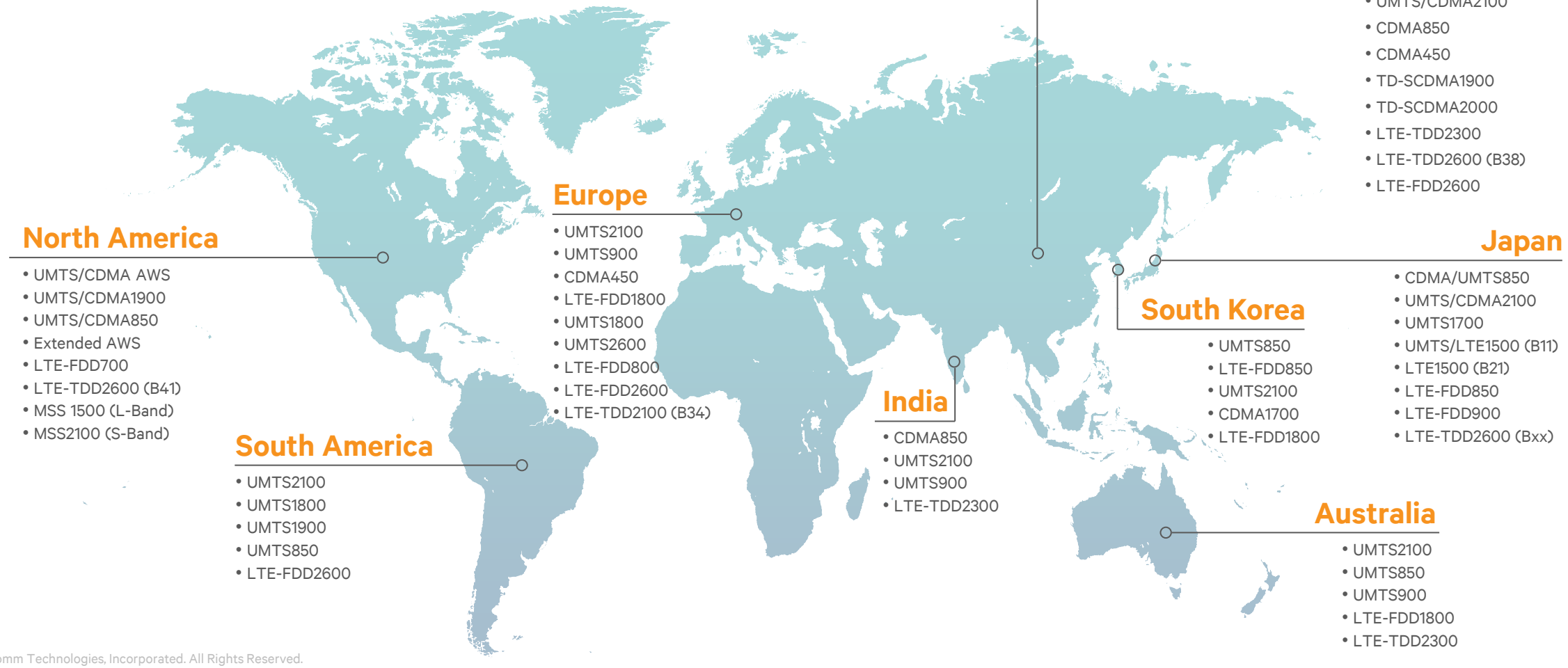
Speaker: Dean Brenner,
Sr VP, Government Affairs

- 4:00pm - 4:30pm **Addressing LTE Band Fragmentation**
  RF360 progress, carrier aggregation and more
- 4:30pm - 5:00pm **The 3G/4G multimode roadmap**
  Including LTE Broadcast, VoLTE and voice interworking

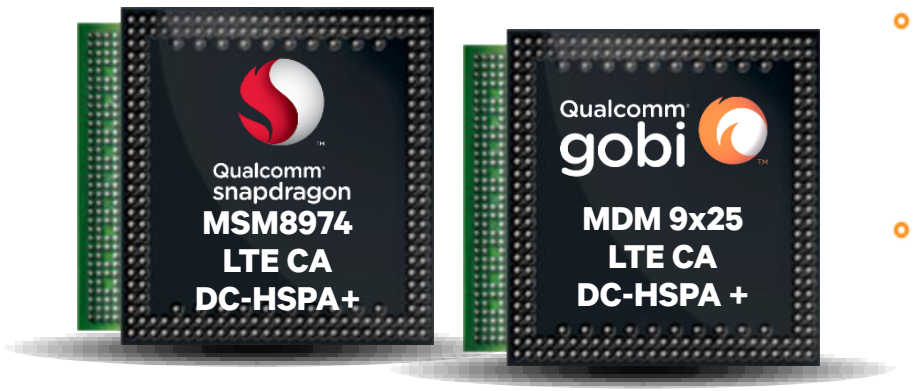
Speaker: Sunil Patil,
Director, Product Management

Supporting LTE multimode activities globally

Support for over 40 RF bands required



LTE & HSDPA carrier aggregation



- LTE CA will allow operators to combine LTE spectrum
  - Higher peak and average user data rates
- HSDPA carrier aggregation will expand coverage of 42 Mbps
  - Takes advantage of expanding UMTS900 footprint

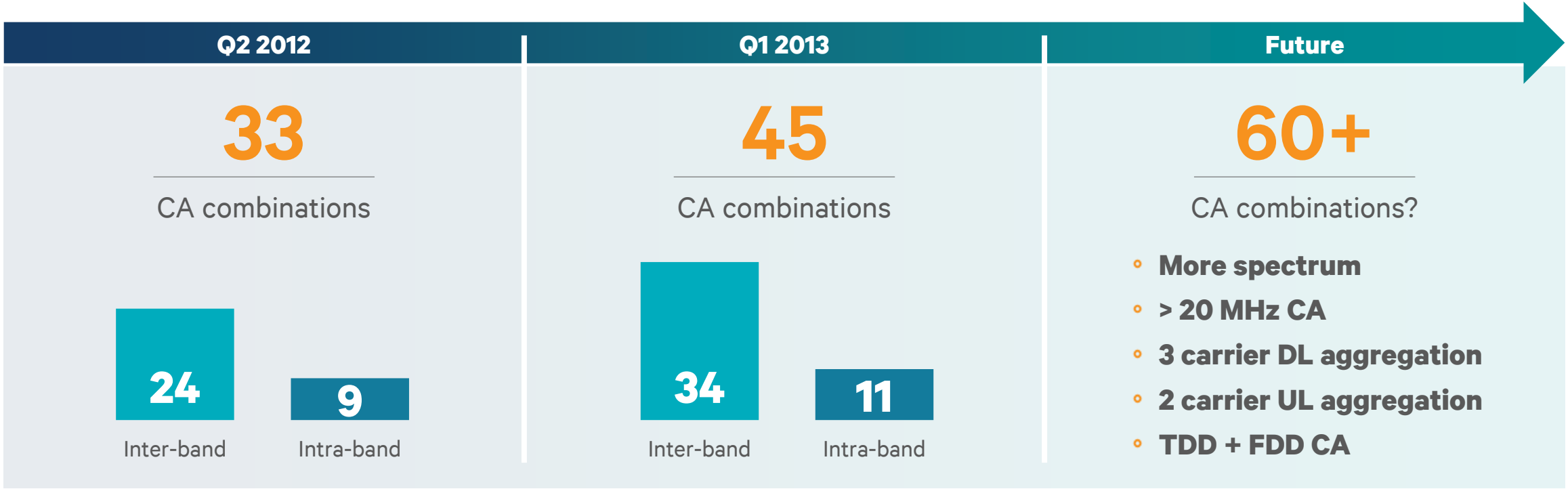
Increased data rates and lower latencies for all users in the cell

Can more than double capacity for bursty applications, e.g., Web apps

Utilizes all spectrum assets

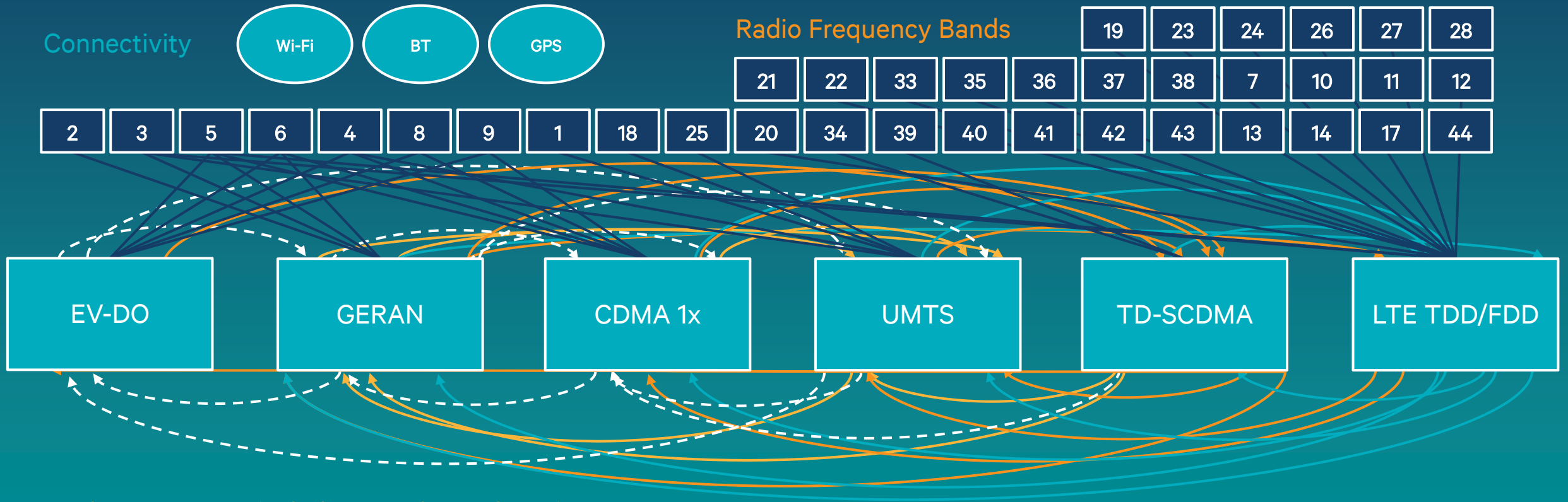
Positioned to lead in LTE carrier aggregation (CA)

- CA key to high data rates while maximizing use of fragmented spectrum
- 45+ CA band combinations have been identified in 3GPP



Our unique advantage

Hiding the complexity underneath the most seamless mobile connectivity



Handover Techniques (Multiple Can Apply in Each Case)

System Selection
Blind Redirection
Redirection w/ Measurements
Reselection
PS Handover
CS Fallback
CSFB w/ SI Tunneling
Single Radio VCC

Handover Combinations (Hypothetical Examples)

LTE →

2G/3G →

RF360 : Addressing cellular radio band fragmentation: 40 bands and counting

All-RF CMOS front end example

Goals

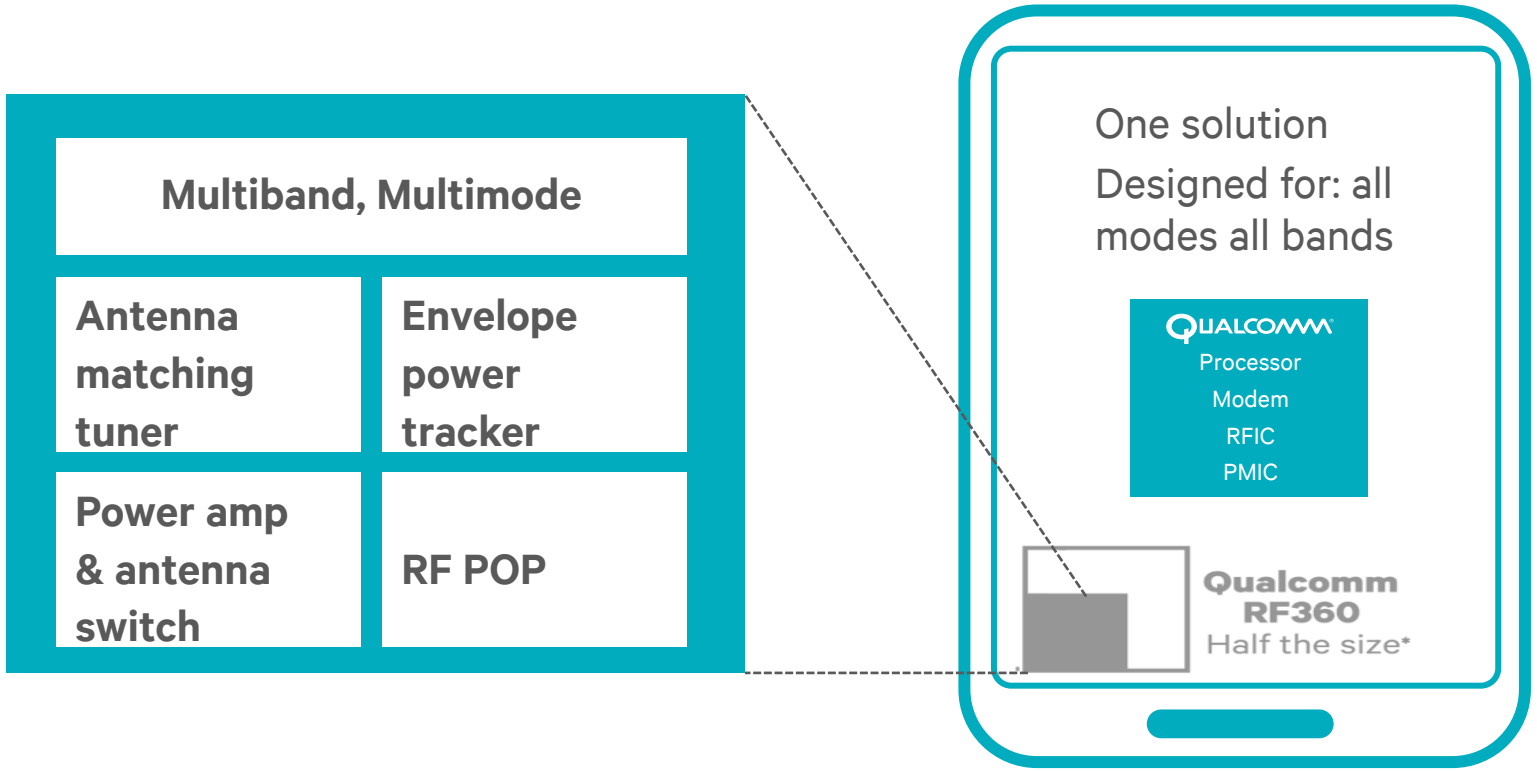
Single SKU

Power reduction

Improved RF performance

PCB area reduction

Reduced development time



Enabled by:

- System-level solution and performance enhancements
- RF CMOS integration advantages
- Innovative 3D packaging – RF POP™

*As compared to the previous Qualcomm RF solution.

Summary of Qualcomm RF360 advantages

Optimized system solution for worldmode LTE

		Performance		Design Efficiency	
	Global LTE coverage	Reduced power	Improved throughput	Reduced size	Time to market
Antenna matching tuner	✓	✓	✓	✓	
Envelope power tracker	✓	✓	✓	✓	
Power amp & antenna switch	✓	✓		✓	✓
RF POP	✓	✓		✓	✓

Thank you

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