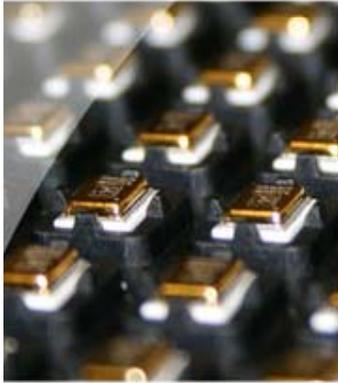




We make wireless work... better!



FCC Band Plan Technical Forum Panel on Filtering Challenges

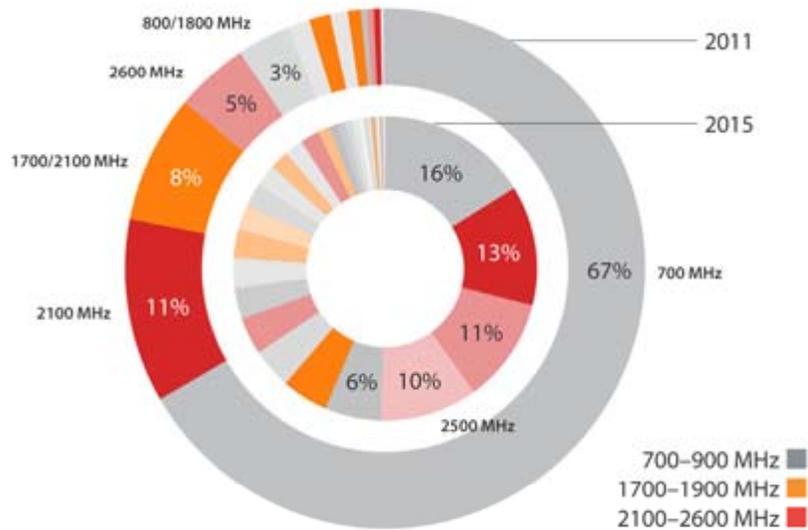


Art Morris, CTO



16 July 2012

- **Global LTE Diversity Projections**



[2011 Wireless Intelligence](#)

- **38 frequency combinations projected to be in use by 2015**

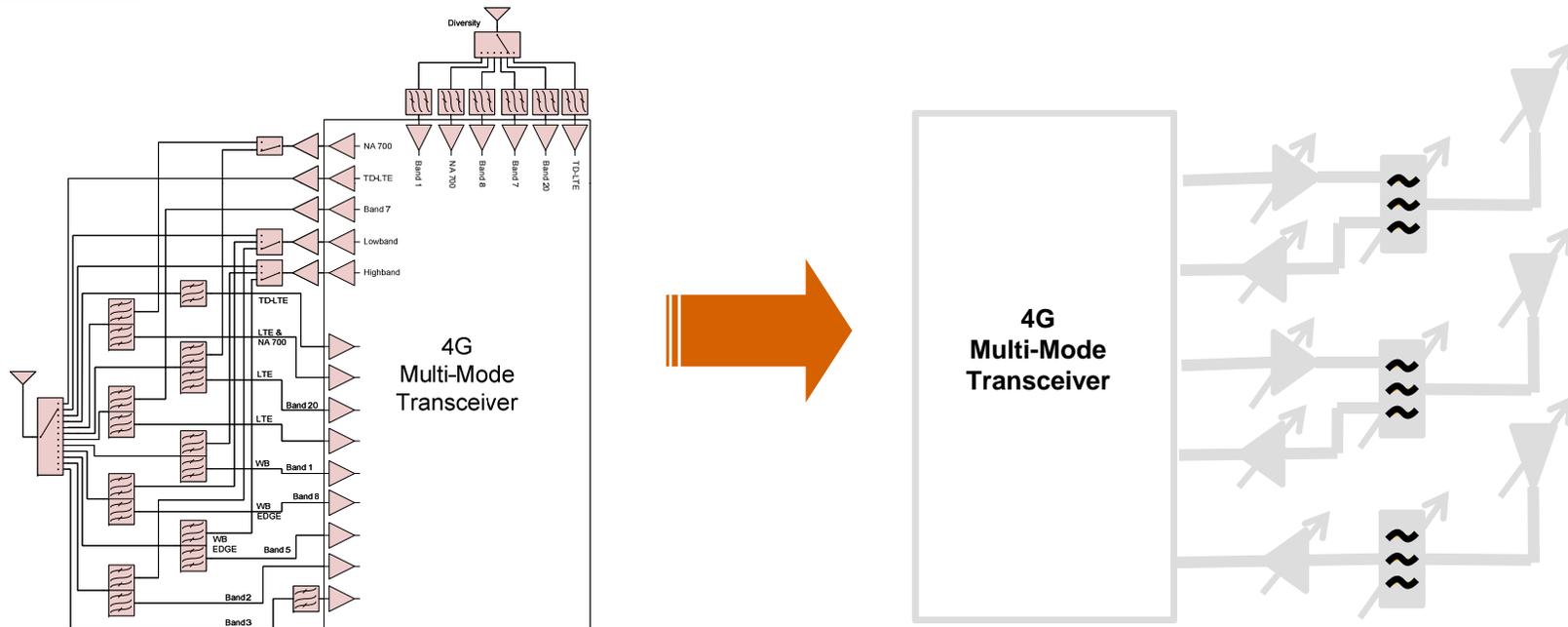
- **US LTE Diversity**

- FD-LTE in 12(A/B/C) , 13, 17(B/C); TD-LTE in 41 and others?
- Devices for Small US Carriers?
 - If so, able to roam?
- Cost effective devices for Public Safety?
 - If so, roam on commercial network?
- Carrier aggregation including use of unpaired spectrum e.g. Mediaflo

- **Incentive auctions/re-farming to add future fuel to the fire**

- Cloudy crystal ball impedes roadmaps
- Frequency extremes yield higher component challenges
- Possible band sharing

Vision and Challenge: Scalable and Tunable RF



- RF Adaptability Enables True Software Defined Radio
- One World, One Radio; Always On Connectivity
- Future-resistant field programmability to enable new spectrum and adjust for added/removed interferers



Proposed Solution: Compact Agile Front-End

Split Hi/Lo bands
Minimizes Cost
And Enables Carrier Aggregation

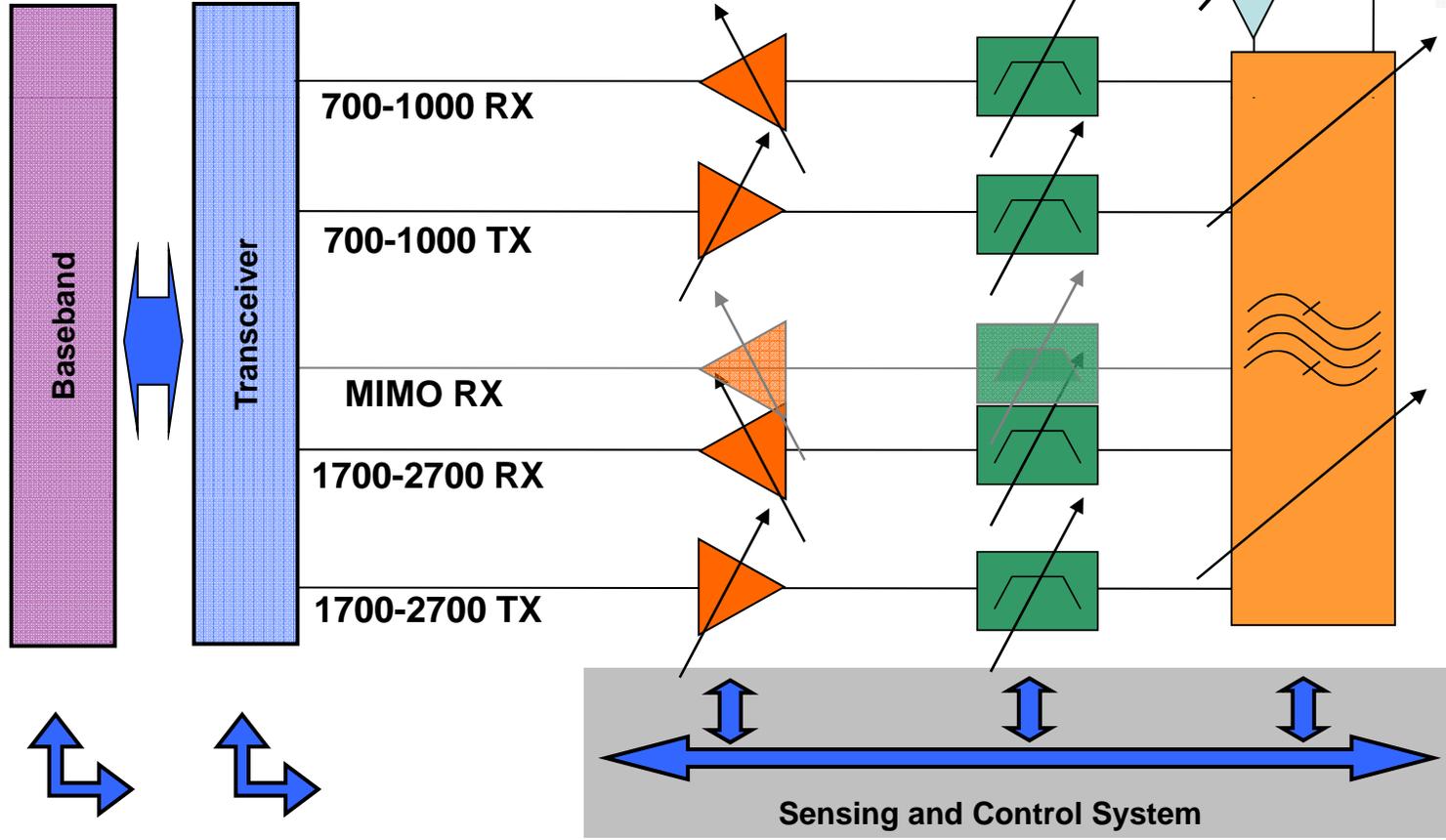
Gain/Power/Frequency
Tunable Amplification

Tunable
Filters

Distributed
Ultra-small
Tunable
Antennas

Antenna
Integrated
Tunable
Duplexer
and
Impedance
Matching

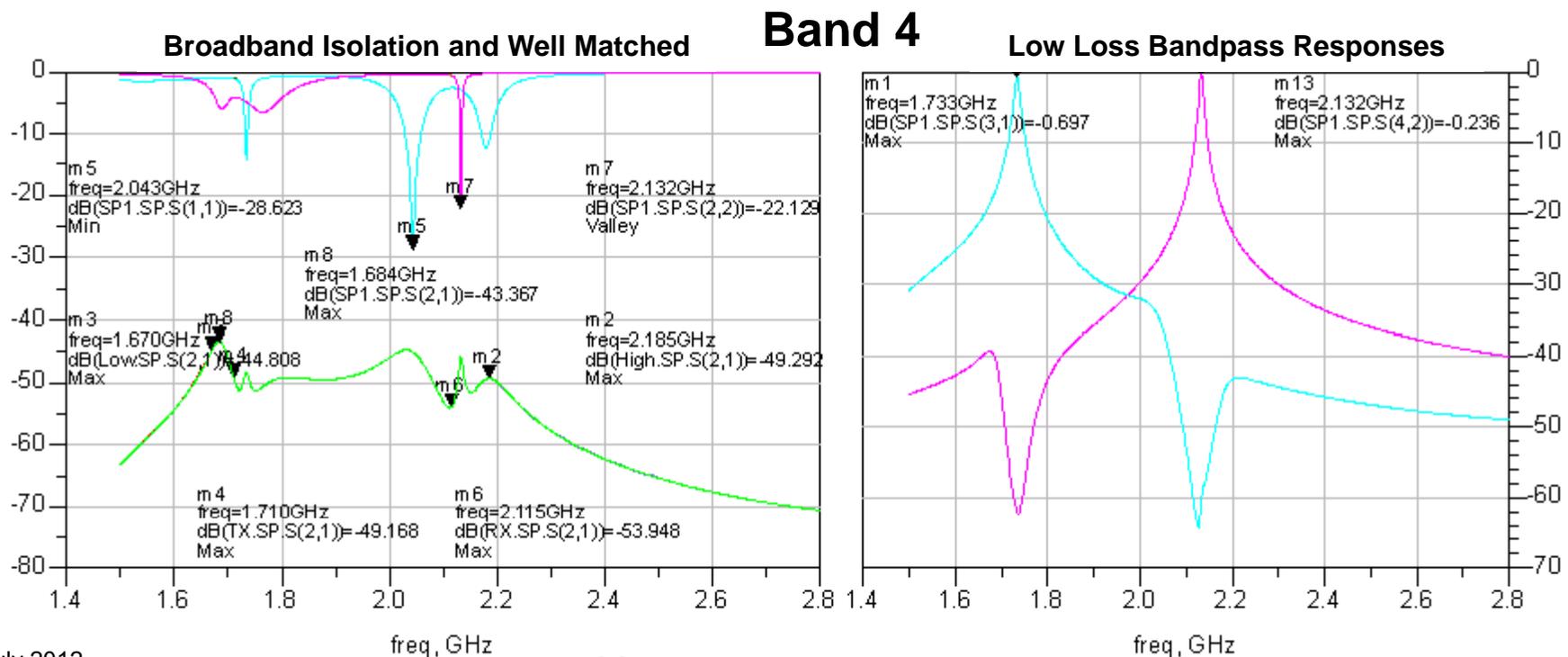
No Switches!
No Acoustics!
Total Volume
< 1 cm³





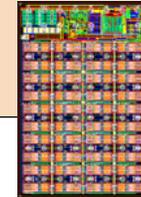
CAFÉ High Band System Simulation Results

- Total path loss active↔radiation ~0.5-3.0 dB (higher overall efficiency)
- Isolation for B1, B2, B4 easily meets TX, RX and out-of-band req'ts
- TDD mode - TX-RX isolation >20dB and far lower losses





Actions Needed



- Enabling technologies now becoming widely available
- **Drive system development through multiple sources of supply**
 - Teaming and investment required across the supply chain

molex



- Ensure stable performance over full set of use cases
- Create practical production radiated device test and self-test
- **Revise methods and standards for type approval**
- **Allocate future duplex pairs optimally with wide spacing**

2012: limited bands, fixed bandwidths, rapid obsolescence

2015: flexible bands, bandwidth on demand, future-proof