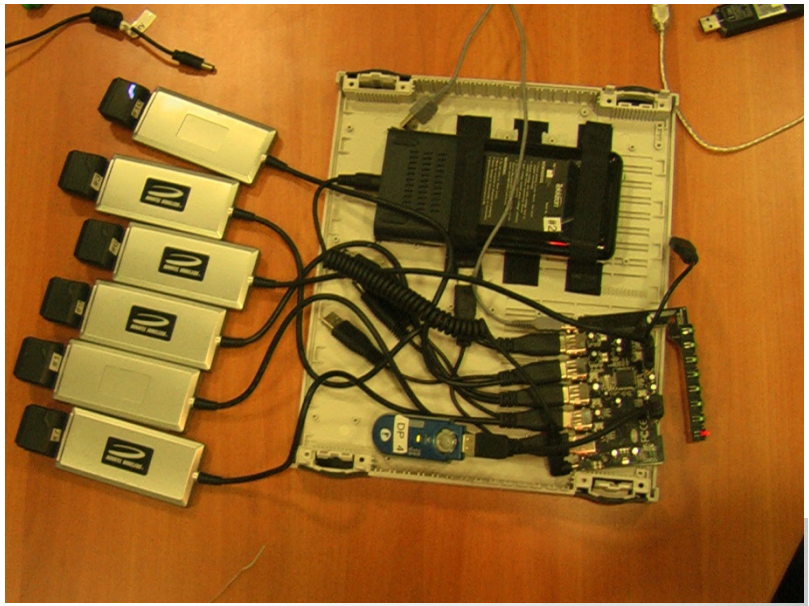
The Evolution of Cellular Bonding

Ken Zamkow
VP Marketing, Americas

First Phase of Cellular Bonding: Prototype

Years	2006-2007
Cellular Technology	Edge (2.5G), GPRS (2.75G),
Hardware	PCMCI Cards, or via actual phone device Encoding on laptop, bonding on separate box Pentium Processor FireWire input
Software/Features	Resolution: CIF Bitrates: 300Kbps, 64Kbps per modem Encoding: H.264
Product Example	Laptop + Modem Box
Usage	Tests by early adopters, only for on-the-move shots satellite can't do. Planned events only.



Phase 2: First Official Product

Years	2008-2009
Cellular Technology	3G
Hardware	All-in-one backpack USB Modems, no RF antennas Dual-core processors Still Firewire, Adapter for SDI/analog
Software/Features	Resolution: Half D1 Bitrates: 1-1.5Mbps Latency: 2 seconds, but limited resiliency Windows-based FTP Short battery time
Product Example	Backpack
Usage	• Early penetration in media for in-motion, breaking news, remote locations • Enable live for companies the never had satellite/micro

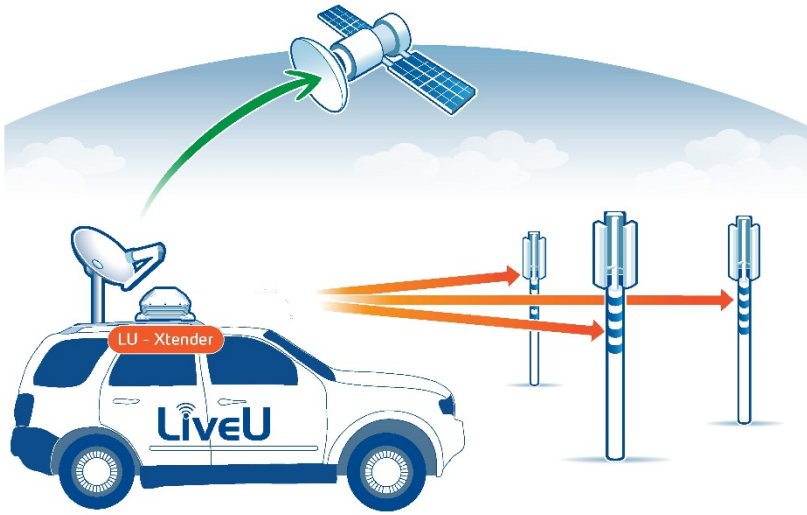
LiveU

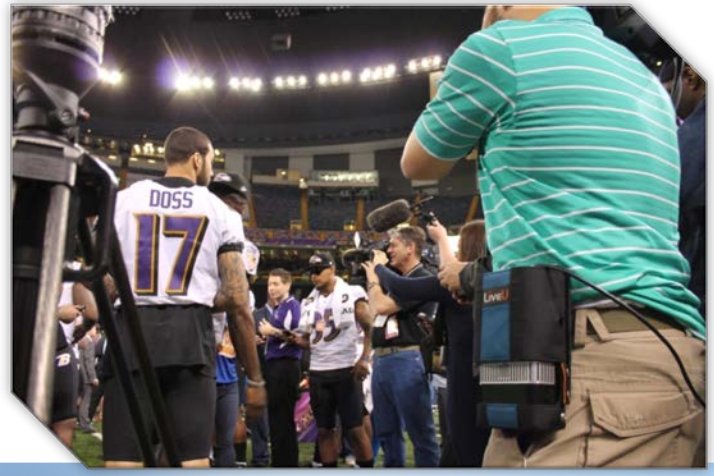
Phase 3: an Industry Rises

Years	2010-2011
Cellular Technology	4G LTE, Wimax, HSPA+, 3G
Hardware	RF antennas modules Xeon Quad Processors SDI/HDMI, Blackmagic video card Ruggedization
Software/Features	Resolution: Half HD Latency: 1 second IFB
Usage	• Stronger penetration among broadcasters • Group-wide adoption • Weather coverage on the move

Phase 4: Portfolio Expansion

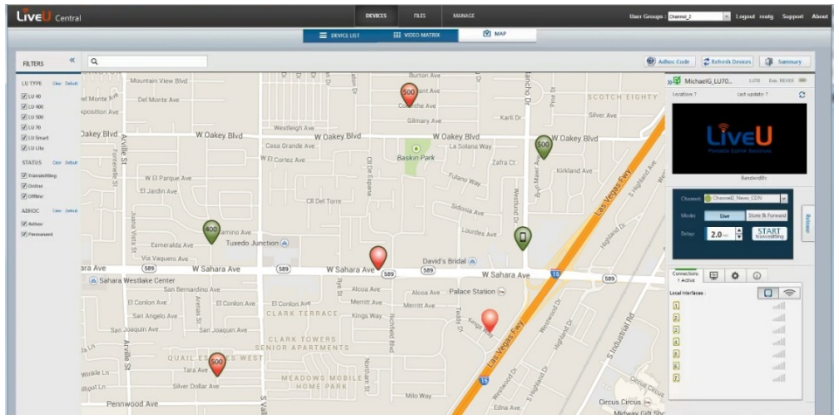
Years	2011-2013
Cellular Technology	4G LTE, Wimax, HSPA+, 3G
Hardware	Smaller ‘mini’ devices and camera-mount units, performance trade-off External antenna for tripod and vehicles Truck/Studio encoders
Software/Features	Smartphone and Laptop Bonding apps Rackmount Bonding Software Group sharing
Product Example	External Antenna, and Truck Encoders, Smart Phone and Laptop App
Usage	• New type of ENG truck • Breaking news from Smartphone • Lower-cost device niche





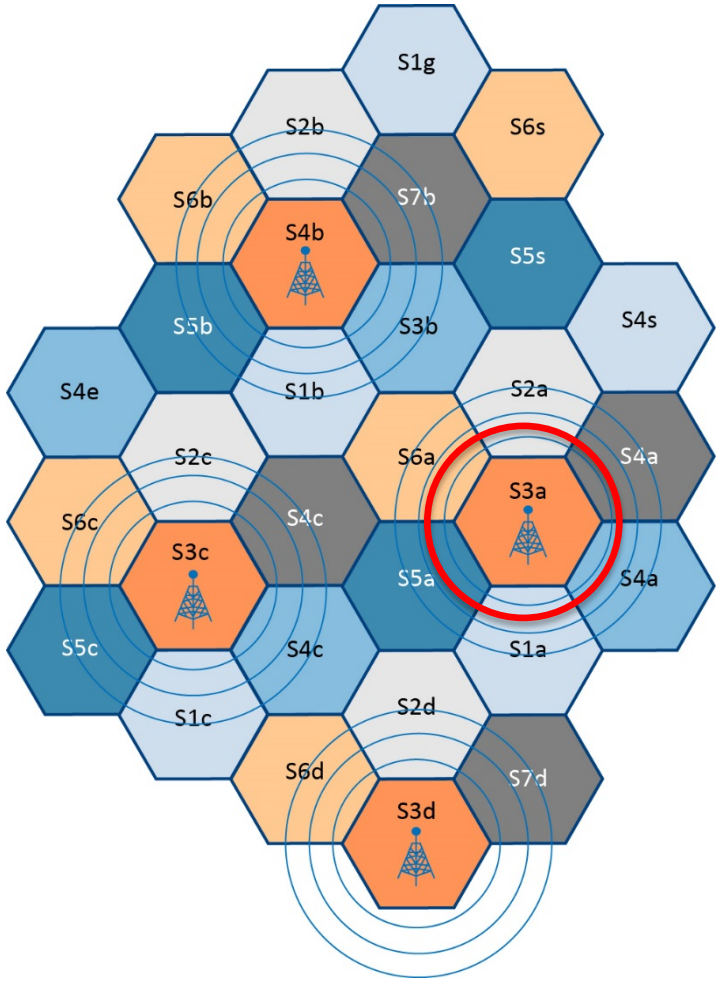
Phase 5: The Next Generation

Years	2014-2015
Cellular Technology	4G LTE widely deployed across all carriers
Hardware	No more tradeoff between size and performance Multi-processor encoding Longer battery life H.265-Ready KA-Band, BGAN HDR, Microwave Hybrids
Software/Features	Additional services on the cloud Gradual move to IP Bitrate: 10Mbps Delay: 1 second Resolution: 1080 Advanced remote control/management Super Hotspot
Product Example	Central management/remote control, Geo-Location, Super Hot Spot
Usage	• Daily usage among 90% of broadcasters • 40-60% of live shots come from cellular, especially from breaking news events • Increased Store & Forward



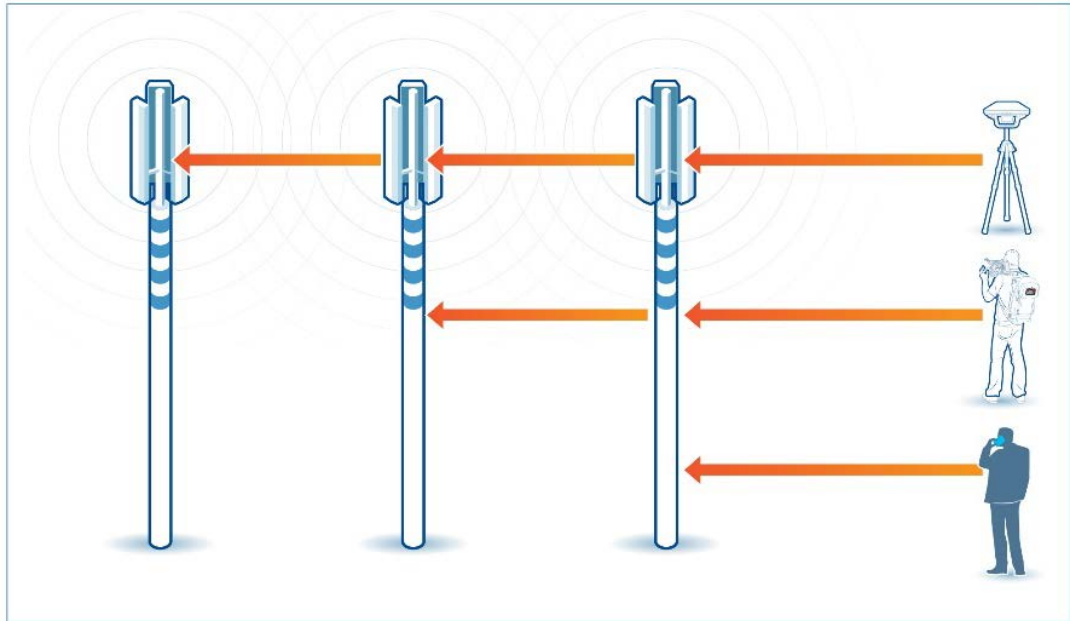
Beating Cellular Congestion

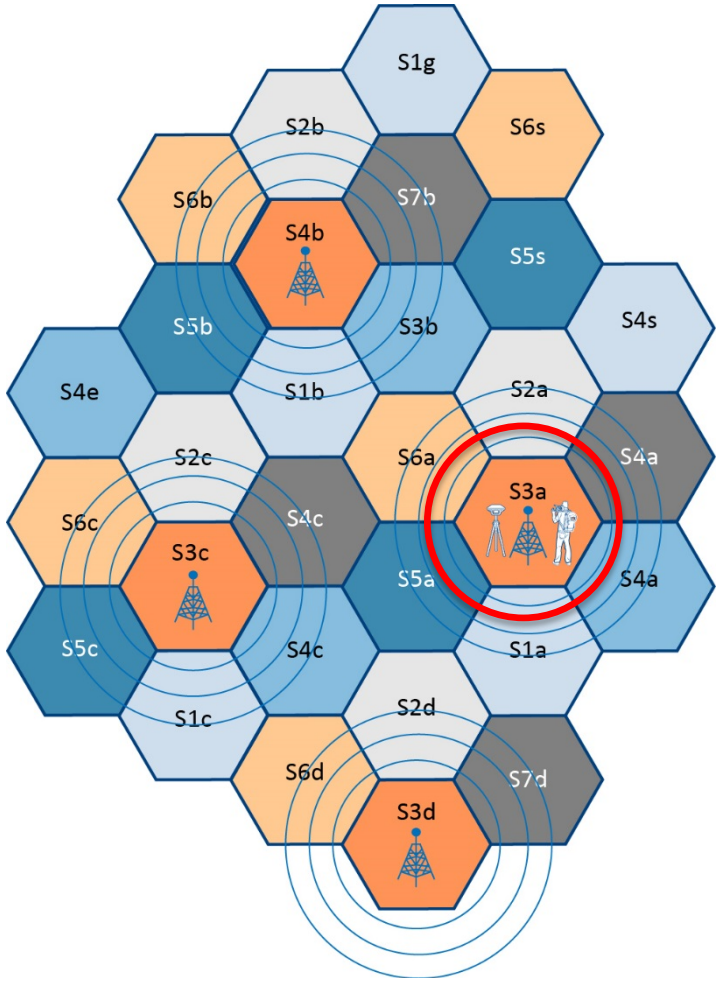
- **Scenario 1:**
  - Cellular Backpack only in S3a
  - Congestion can impact bandwidth



External Antenna Near the same Cell Tower

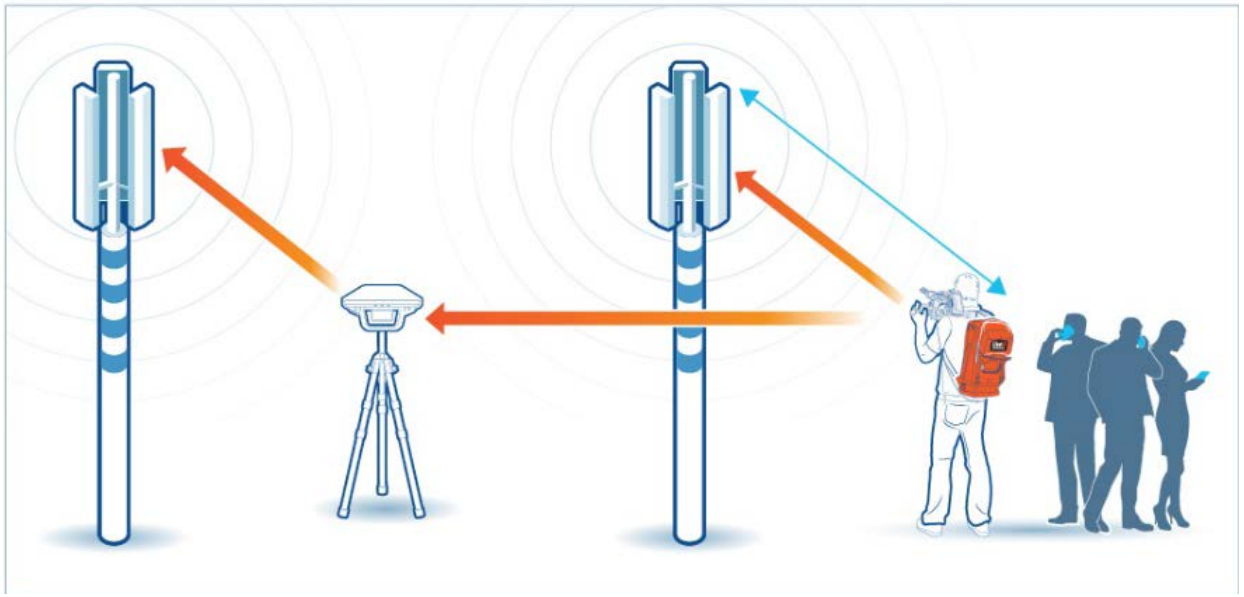
- **Scenario 2:**
  - Cellular Backpack and External Antenna are both in S3a
  - Congestion can impact bandwidth, range longer, signal cleaner

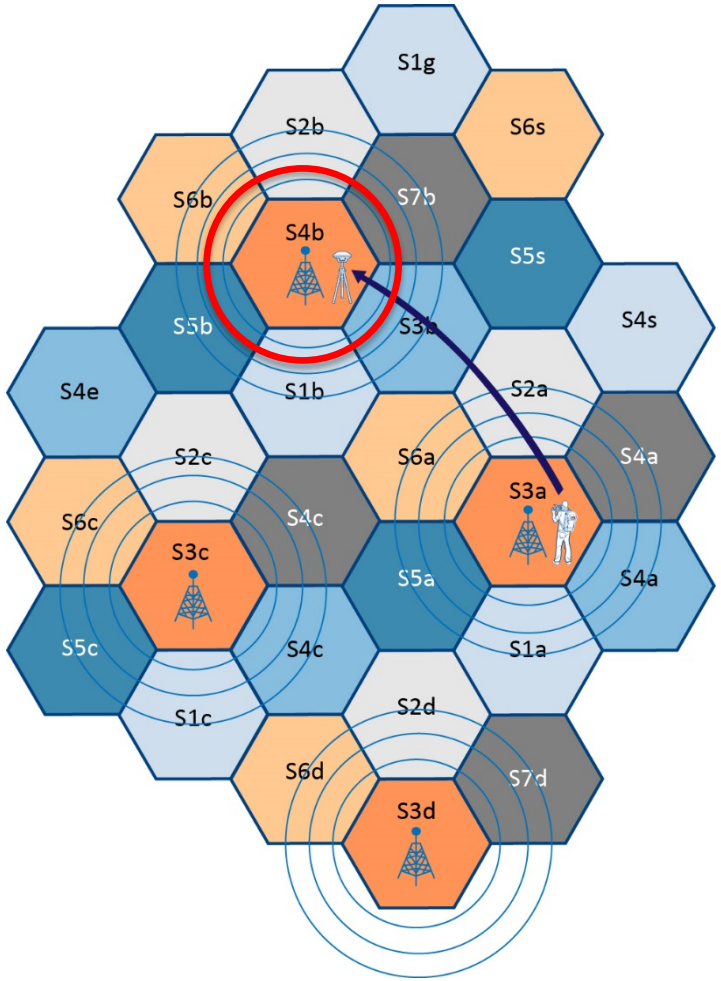




Remote Antenna Near Other Tower

- Scenario 3:
  - Move External Antenna to S4b, connect to it via RF (up to 2,000 ft with small antennas)
  - External antenna will not be impacted by congestion





Thank you