# Unofficial Notes:

# STS Global Tech Day

## August 18, 2016 Stony Brook, NY

**Confidential: Summit Ridge Group, LLC**

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**STS Global Tech Day Program Notes**
August 16, 2016
Stony Book University, New York

**STS Global has added the presenters' slide presentations to their website at:**
**http://www.stsglobal.com/blog/. My summaries of the presentations are below.**

**8:45 to 9:00am - Opening Remarks** – Dave Hershberg, CEO STS Global;
- STS is 18 months old and has already done four earth stations. Many of the employees are from Dave's former company, Globecomm Systems

**9:00 to 9:15am - HTS Making a better world** – Lou Zacharilla, Society of Satellite Professionals International (SSPI).
- Showed video about the value of the satellite industry including one of about how a winery is using remote sensing to improve production. Used to encourage young people to come into industry;
- Showed video about broadband via satellite for developing nations. Showed examples of rural broadband development;
- Generally enthusiastic about the industry.

**9:15 to 9:45am – HTS – The Next Big Thing? – Lou Zacharilla, SSPI and Caleb Henry, Via Satellite**
- More change in satellite industry in past 2-3 years than in last 20-30 years;
- Satellite industry is growing as new markets are developing – almost sounds defensive;
- Perception that broadband is a "human right" or least an expectation is seeping into political and economic discourse;
  - Speed expectations are dramatically increasing
  - ABS's Tom Choi has apparently indicated all their future satellites will have "ultra" HTS capacity
  - Gap between what DoD and commercial sector can do. Commercial sector is forced to innovate and then DoD tried to adopt some of the commercial innovation. But DoD has an "innovation unit"
    - Some innovations claim to be on edge of solving rain fade
    - Anti-jamming technology can help commercial privacy challenges
- Satellites starting to evolve like Moore's law and join the rest of the communications sector
  - Need to really lower pricing to increase demand

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- o Does increased connectivity increase demand

**10:00am to 11:00am – Broadband Connectivity – It's all about Throughput – Stephen Yablonski (STS Global) – Moderator; Mark Stodgill (Hammer Fiber); Mike Cothill (GlobalReach); Cristi Damian (Advantech).**

- Satellite is close to parity with LTE on pricing!
  - o Pay about $5 per gb for LTE – similar to HTS
  - o Satellite HTS CPE ~$400 – similar to LTE
- Frequency reuse and contention are very important
  - o Fiber uses frequency reuse as well
  - o Broadcast is essentially the ultimate form of reuse
  - o LTE has lots of reuse – a carrier may only have 10 MHz in an area
- Future HTS systems will likely increasingly have adaptive beams that can adapt to the traffic – would dramatically change effectiveness of capacity
  - o Technology is available to adjust beams between spot beams and wide beams
  - o Cost of HTS satellite is driven by power and weight NOT the # of beams.
  - o Advances in amplifier technology allow more power to be placed in orbit
  - o Higher frequencies (Ka-band) make it easier to create many beams
  - o Spotbeam HTS
    - ▪ Highest capacity – lowest cost unicast BW
    - ▪ Allow specific market grooming
    - ▪ Steerable arrays and on board processing allow adaptable cell structures and beam size
- Getting to "fiber to the air" capabilities via LTE – this is impacting fiber buildout
  - o Next generation wireless is making fiber builout harder to justify
  - o Satellite is may approach these capabilities for fixed service as well
- DVBRCS – early frequency management – used for IP services
  - o TDMA can't handle large bandwidth applications, but is low cost
  - o Need networks that can handle multiple protocols for different applications
  - o Want to use higher and higher modulation schemes, but need higher power for this
- To handle complex switching, teleport needs to be operated by the satellite operator – puts some independent teleports in difficult position
- HTS conversation is now based on bits as opposed to hertz – allows discussion of what people really count

- Value of universal connectivity is going up – due to wireless industry expectations
- Can only get more money/bit by selling the application vs. bandwidth
  - Consider the shipping industry – people pay more for overnight vs. standard
  - With applications, people pay less attention to price per bit and look at value of application
    - **Armand's comment – Is the satellite industry really ready to be competitive application developers? Isn't there a well-developed application development ecosystem in places like silicon valley that could tackle this?**
- Satellite antennas are becoming less and less asymmetric
- Satellites are moving to satellite deliver to a central point and then distribute locally with LMDS, MMDA etc. or into Internet
  - More secure and less expensive
- Some dispute that HTS might work fine with private gateways. Teleports must have own gateways
- Satellite operators are now selling directly to end retail users – big change.

**11:00am to 11:55am – HTS Technology and Satellite Backhaul for 4G LTE -- Stephen Yablonski (STS Global) – Moderator; Bruce Bednarski (Xiplink); Richard Swardh (Comtech); Brett Calder (Sunroute Network)**

- Ericcson wireless study
  - by 021, over 90% of world's population will be covered by mobile broadband networks.
  - By 2019, LTE will take over as largest wireless technology globally
- Satellite evolution
  - Moving from TDMA to IP (several earlier technologies)
- ViaSat critique (Bruce Dednarski)
  - Set-up for consumer
  - Despite declining price, satellite is option of last resort
    - Promise of competing with terrestrial is not really materializing
    - **Armand's Comment – I think ViaSa is somewhat more effective against terrestrial options in limited areas than Bruce gives credit for. Future generations including ViaSat 2 and ViaSat 3 will do even better.**
  - Mobile data traffic growing at 53% annually

- **Armand's Comment – Wireless industry has consistently overestimated rate of wireless traffic growth (see: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2418364) . But I acknowledge that wireless traffic is growing rapidly.**
- Supporting data backhaul is expensive vs. voice for satellite –
    - ~20x capacity for 4G vs 2G and ~5x for 4G vs 3G
    - Satellites need to lower cost – possible opportunism with network and transport layers
        - 4G base stations are more tolerant of latency
        - LTE comes with some gpp tunneling and other issues, but those are being overcome
        - Now getting IPV6 compliant – not easy, but doable
- Application developers are now getting used to developing of networks with weak performance
    - Facebook adapts based on backhaul conditions (compression, service features etc)
        - Applications are now capable of dealing with latency, lower speeds, etc.
- IOT starts with 100% packet technology – makes it a lot easier to roll out
- New variant of LTE – "LTE-M" or "LTE-MC" Machine or machine communications that is optimized and more resource friendly for LTE.
    - This will help a modem last for 5+ years on a single AA battery. Power consumption is a big issue and this should really help drive demand.
- **Armand's comment: Panel discussion of the greatness of asset management via satellite (M2M)**
    - **Didn't mention the really hard history (ORBCOMM etc.)**
    - **Not sure why this time is so much different**
- Rain fade is a challenge in areas where HTS is used for cellular backhaul
- Wireless operators have data rate requirement and QOS that many HTS systems can deliver
    - 99% availability is not enough for a wireless operator, even though user experience is worse
- Public safety is converging on LTE

**1:00pm to 1:55pm – Cybersecurity for Broadcasters – are you prepared? Ron Clifton (Clifton Group International Limited - https://cliftongroup.ca/ )**

- Threats are real and growing. Ways to deal with include security standards:
    - NIST Framework (National Institute of Standards and Technology)

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- CIS Critical Security Control
- FCC Working Group four – endorsed NIST framework for broadcasters

- All industries are affected by cyber security challenges
  - 64,000 attempts
  - 4% actual breaches (got in and did something malicious)
  - Smaller companies are less protected and attempts have higher breach rates
- Q1 2016 -- $215 million has been paid out in ransomware attacks
  - Ransomware attacks are increasing
- Threats used to be mostly insider, not most (~80%) are from outside, but some of largest ones are from insider
- Cyber Calafat is emerging
  - Not particularly sophisticated by getting more so
  - Hacked Michelle Obama's Twitter account
- What can we do?
  - Feb 12, 2014 – Gov't order to set-up plan for Industry to help secure itself
  - Uses NIST framework
- Other Frameworks
  - Council on Cyber Security, Paris has some international framework recommendations
  - ISO 27001 and 27002 – Gold Standard on Cybersecurity – very expensive
- Smaller companies particular vulnerable due to lack of resources

**2:00pm to 2:55pm - Ka-band/HTS Network: Where complexity meets technology – Lou Zacharilla, SSPI (Moderator); Steve Good (Comtech); Mike Cascone (CPI); Drew Kline (C-COM); Gerhard Franz (AG Franz).**

Steve Good
- HTS means different things to different people (Ka, Ku, C-band, UHTS, SHTS etc).
  - Different designs built for different applications
  - Need to maximize #bits/hz that your modem can use
- Strong demand increase in HTS. Overcapacity, but with different applications this is not the case everywhere
  - **Armand's comments – Mr. Good seems to downplay the idea of HTS capacity being a commodity. Not sure I agree that it will be easy to differentiate to the extent necessary.**
  - Frequency reuse – has increased capacity
  - Need to be future proof – (how do you do this)

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- - - IP is not satellite friendly, but that can be streamlined to drive down transport costs
      - Intelligent networks can do the same things

Drew Kline
- Make and auto acquirer antenna system.
- Lots of new entrants suggests a new "golden age" of satellites
  - New HTS systems will mean more ground equipment sales

Gerhard Franz
- Teleport operator has more costs when dealing with HTS systems
  - HTS has more beams and will need more rebroadcasting
  - LNB Ku-band -- $200-$250  Ka-band $1,500
  - BUC Ku-band $400 Ka-band $1,000
- May have teleport consolidation that concentrates customers

Mike Cascone
- HTS systems are more complex to get to lower cost/bit
- High power amplifiers (500 watts) are common – 700 watts are possible
- Amplifier prices have come down and product lifespans are ~30- 50% longer

Other Comments from Q & A
- Teleports are critical of satellite operators selling directly and going around teleport operators
- No one wants CW amplifiers anymore, only the peaks ones. TT&C is only demand for CW amplipher
- Network has become incrementally complex with the number of beams
- Important for hardware, including controllers, to be flexible and integrate with as many others is highly desirable
- Adaptive coding to remove headers etc will all happen inside the modems.

**Closing Remarks – Dave Hershberg**
- Thanks for coming – hope you learned something