VIASAT

Enabling Virtualized and Digitized MILSATCOM

Demonstrating Modem Virtualization and Digital IF with COTS Hardware

Zach Amodeo, Doug Wilson
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Demonstration

- CPU-based, virtualized EBEM transmitter, running on consumer-grade hardware, performing:
  - User data packetization
  - Forward Error Correction (FEC) encoding
  - Symbol generation and waveform framing
  - Modulation and root-raised cosine filtering
  - DIFI packetization

Applications

Various platforms due to software-based design:
- Solutions requiring hardware agnostic and flexible architectures (MOSA, SOSA, CMOSS)
- Cloud modems
- High data rate, high-power applications with large computing resources available, such as teleports

Impact Potential

- Allows DoD to focus on the warfighter, rather than hardware obsolescence, management, and sustainment
- Waveforms could be sold as a software license to run on generic COTS hardware
- Resiliency through DIF failover and ability to physically separate cloud modem from emitting agent by large distances
- Modular software increases the flexibility of systems to reduce the overall SWAP of systems
- Software operation in virtual machines (VMs) enables platform flexibility and isolation of data

Lessons Learned

- Virtualized modems' capabilities are highly scalable based on available processor resources
- Hardware acceleration (FPGA, GPU, ASIC) is still valuable for extreme data rates and Low SWAP

Future Development

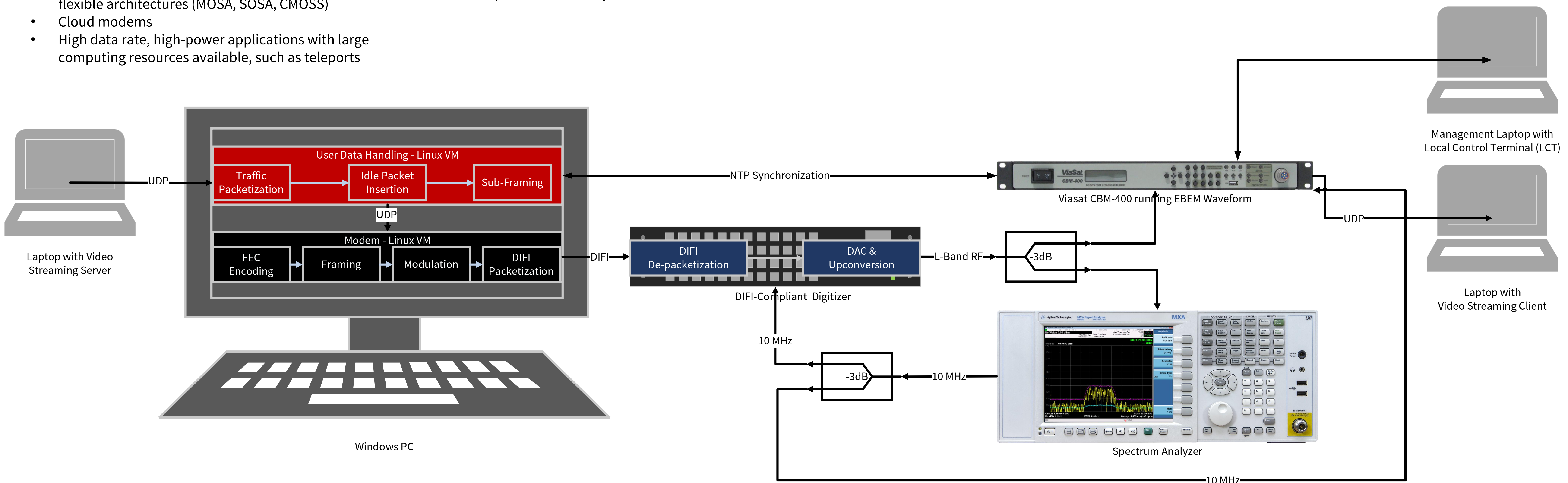- Expanding transmitter functionality to more symbol rates and modulations
- Receiver implementation
- Software optimization for higher data rates

PC Specifications

- Intel Core i7-10700 CPU @ 2.90 GHz (2020)
- 64 GB RAM
- Windows 10 x64
- Oracle VirtualBox VMs running Ubuntu 18.04 LTS

Carrier Specifications

- 1.17 Msym/s, 2.34 Msamp/s
- 1.15 Mbps
- QPSK-1/2
- STANAG-4486 ed. 3 compliant

Demonstration Diagram