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Cornicen: Commercially Augmented Resiliency Through Data Conversion

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- SMC has been at the forefront of Innovation and Reform
 - Space Pitch Day (SPD) 2019
 - New partners, innovations and non-traditional startups to keep the Space Force and space industry competitive and evolving
- Combination of product expo and reality series
 - Most promising developers pitch their ideas
 - Opportunity to win on-the-spot Small Business Innovative Research (SBIR) contracts
- Analytical Space Inc. (ASI)
 - Pitched Cornicen to commercially augment USSF resiliency efforts through novel "converter satellite" that enables new SATCOM pathways
 - ASI's Cornicen deployment is 1 of 11 SPD efforts managed by ECX

ECX Contributes to the Ground Enterprise through Innovative Acquisition



Cornicen Concept of Operations

- **Cornicen** Received and sounded orders to the Roman legions from commanding officers
- Paired with a partner GEOINT satellite, Cornicen acts like these Roman sentries by routing TT&C commands and GEOINT mission data to and from end users via use of modular software defined radios and a bent pipe connection to partner networks in GEO
- Cornicen will commercially augment and modernize existing data transport architecture



TT&C Data Path:

Cornicen relays TT&C Data to and from the GEOINT partner that it has received from a MOC and through the geostationary orbit-based network.

Mission Data Path:

Cornicen receives Mission Data from the GEOINT satellite and relays down to Earth directly to user selected ground station or into future deployed ASI Fast Pixel Network nodes.



ASI's Fast Pixel Network (FPN)



- LOCATED IN LOW EARTH ORBIT
 Low Latency & High Throughput
- SOFTWARE DEFINED SMALLSAT ARCHITECTURE
 Backward Compatible & Future Proof
- MODULAR PAYLOAD FRAMEWORK Interoperability & NSA Spec Security
- MULTIPLE ORBITAL PLANES Data Path Diversity & Global Coverage

Modernizing satellite communications architecture and enabling resilient new data pathways to speed data to U.S. and allied warfighters.



Cornicen Architecture

- Highly modular Software Defined Radios (multiple RF bands)
 - Allows maximum access across the RF spectrum and the ability to communicate with both partner sat and the partner network in GEO.
 - Enables the ability to close intersatellite links with both legacy and future commercial and government spaceborne assets.



- Inclusion of L-band transceiver supports access to GEO constellations
 - Enables always-on TT&C capabilities for serviced Commercial GEOINT satellite
- Optical Transceiver Demonstration
 - Tests Cornicen's ability to close an OISL from Cornicen to its Fast Pixel Network backbone satellites and demonstrate larger data transport constellation architecture and bent pipe framework.
- Wideband Antenna Payload
 - Enables broad spectrum access for ASI's SDR architecture.



- Cornicen Converter Satellite concept and Fast Pixel Network are highly complimentary and symbiotic
 - Cornicen is the equivalent of an "electrical outlet adapter" & enables new communications pathways; remote sensing platforms can utilize existing comms hardware to access FPN and downlink data faster
- ECX leveraged exciting investment opportunity to bolster capabilities
 - Cornicen concept can enable faster and persistent TT&C for a variety of partner satellites; potential to deploy at large after Cornicen demo.
 - L-Band connection to GEO-based network and demonstration of proximity operation capabilities present unique capability sets.
- ASI, SMC, and AFRL Engaged on STRATFI Contract Vehicle
 - Initial Fast Pixel Network backbone deployment
 - Six FPN nodes in half orbital plane
 - >\$50M effort



- Cornicen example of revolutionary new Acquisition style
 - SMC/ECX adapting to ever-changing demands of space comms
- Exponential Increase in data flow to/from/through space
 - Current ability of government owned, operated, and maintained data transport cannot keep up with commercial industry
 - Augmentation from the commercial sector provides a new and innovative way to allow for rapid technology readiness level increases and enhanced ability to accomplish the mission
- Cornicen technology is novel in the commercial sector, but has been deployed in different iterations on government owned sats
 - Commercial Dual-Use deployment presents opportunity for SMC to gain similar capabilities for less cost





- Space Pitch Day is an innovative acquisition approach
 - Sows the seeds for future technologies to bloom
- Cornicen is a prime example of continuously shifting capabilities
 - ASI discovered temporary capability gap between legacy systems and developing technologies – need will eventually diminish
 - Researching Cornicen for other potential uses in Space
- Change in how we utilize and manage the technologies we have
 - Utilizing the commercial sector of space to compliment our own infrastructure
 - Variety of potential partnerships within SMC and ECX
 - EGS/CAS/CASINO/ ETC.





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