MuTC Additional Information

Description of the operation to be conducted

Muscatatuck-Cyber range is cyber-physical range consists of controlled closed looped interdependent information technology networks, operational technology networks, telecommunications networks, computer systems, and control systems that are embedded in physical infrastructure, telecommunications/radio frequency networks, and the electromagnetic spectrum. The range replicates a real-world environment across physical, logical, and cyber-persona layers that can be used for research, development, testing, training, and evaluation through the competition continuum.

The Muscatatuck (MuTC) 3G, 4G, and 5G cellular system will provide a commercial grade cellular communications environment to replicate real world systems that will have flexible configurability to be tailored to specific testing or training requirements.

The cellular system provides complete coverage of the MuTC training area using six RF sectors transmitting from four fixed antenna locations. Each fixed location can support any combinations of radio access network (RAN) technologies and additional sectors if needed depending on user density.

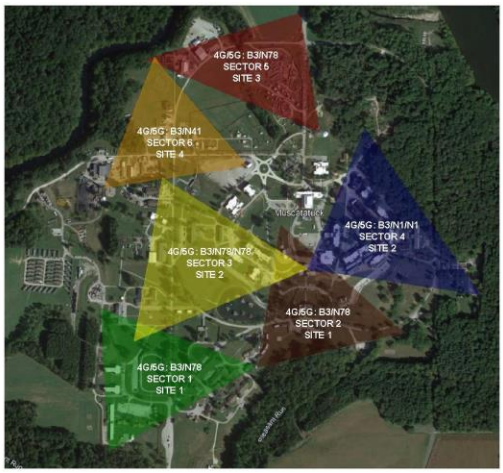
Muscatatuck Cyber Training Center requirements are for a cellular 3G, 4G, 5G Non-Stand Alone (NSA) and a 5G Stand Alone (SA) cellular networks and capable of supporting a variety of frequency bands.

Radio Access Network (RAN)

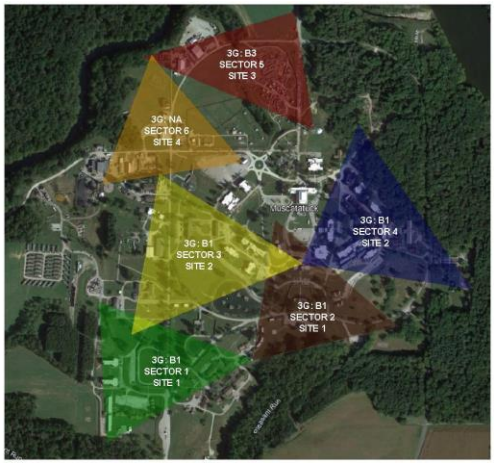
The RAN Solution provides offers carrier-grade bandwidth, flexibility, and scalability to facilitate the various training scenarios we are supporting.
Each tower location will be segmented into multiple, 120-degree RF sectors resulting in six possible cellular segments. This division is based on the limited user density anticipated during training events. Other configurations are possible. Not all sectors will need to be active to provide the desired coverage to the training areas that will host user activities. The study determined that at a minimum, six active sectors are required. Each of these sectors may be populated with different RAN technologies and in different

frequency bands independent of the others, providing flexibility in how training areas and scenarios within those training areas can be planned and supported by Onyx.

4G/5G Sectors



3G Sectors



The installation includes new wide-band antennas specified to support multi-band operation in the 694-3500 MHz range and will also include the required triplexers and filters providing a flexible and extensible RAN environment.

There are different frequency bands used by each global region and country. To provide a realistic training environment representative of specific global locations, Onyx provides the flexibility to mix and match radios within any of the six (6) MUTC sectors.

Location: Muscatatuck Training Center, Butlerville (Jennings County), IN

Dates, times, duration:

January 15, 2024 – March 10, 2024
July 15, 2024 – August 21, 2024

Frequencies: We are flexible to operate on any available frequencies within your spectrum. We are capable of scanning to see what spectrum is in use prior to transmission to not cause interference and we are willing to provide prior notification if required.

Planned frequencies are:

LTE/NR Band 3 DL FDD 1805 - 1825 MHz / UL FDD 1710-1730 MHz
LTE/NR Band 3 DL FDD 1830 - 1850 MHz / UL FDD 1735 - 1755 MHz
LTE/NR Band 1 DL FDD 2110 - 2130 MHz / UL FDD 1920 - 1940 MHz
LTE/NR Band 41 DL/UL TDD – 2680 MHz
LTE/NR Band 42/N78 TDD DL/UL 3400 - 3470 MHz
3G UMTS Band 1 DL FDD 2125.0 MHz / UL FDD 1975.0 MHz
3G UMTS Band 3 DL FDD 1842.6 MHz / UL FDD 1747.6 MHz

Power Settings: .EIRP ~200 Watts to limit signal to stay within Muscatatuck Training Center

Processes:

a. Antenna orientation and down-tilt increased to prevent coverage intrusion on existing commercial networks.
b. Forward transmit power levels are reduced to prevent coverage intrusion on existing commercial networks.
c. MuTC employs a spectrum monitoring system to ensure interference is reduced or eliminated prior to initiation of network forward broadcasts. The monitoring system has the capability to view and determine all MuTC broadcast spectrums of interest and commercial network broadcast for the STA.
d. MuTC will gain consent from spectrum owners