



Continuing research into 3200-3550 MHz and new research into 470-512 MHz band transmitting and receiving equipment in support of sports television and special event production within various large and small scale venues.

1. With the continuing changes to the various BAS bands, recent advances in technology, and smaller form factors, CP Communications (“CP”) is continuing research into the 3200-3550 band begun under call sign WJ2XLF. With this new request, CP looks to
  - a) Expand the RF video testing and research to include the Tampa market where CP has an immediate and continuing presence, and which offers different operational and logistical characteristics than the current research location of New York under WJ2XLF.
  - b) Expand the testing to include the 470-512 MHz band (aka “T-Band”) for the RF communications systems that accompany the video system deployments.
2. The Tampa area offers CP a significant number of various size venues, both indoors and outdoors, in which to experiment with new designs and workflows to be utilized for CP clients requiring portable handheld camera and communications coverage. The primary difference with this market as compared with the current field testing location of New York city is height and density of building structures. This new location is very near CP’s new equipment distribution location which includes an engineering lab.
3. Our experimentation in these varied venues and feedback from our field technicians will also help OEM’s of the various equipment CP utilizes to better design their equipment to meet the demands that sports entertainment and special events industries places on this equipment.

## Goals

1. Determine optimal combinations of transmitter and receiver system equipment and configurations, including antenna designs and types, in both the 3200-3500 MHz and 470-512MHz bands.
2. Continue research and development for maximizing spectral efficiency.
3. Provide CP with better understanding of improving efficient deployment strategies and workflows under challenging conditions.



4. Continue to test equipment, deployments and workflows in order to improve battery life without detriment to RF performance.
5. Continue to investigate equipment choices and deployment when applied to remote control vehicles and aerial systems.
6. Continue to ensure interference mitigation to co- and adjacent channel users while optimizing video and communication systems performance.
7. Develop operating guides to help ensure repeatable performance with the different systems at various venues.
8. Develop improved packaging and form factors for the RF equipment.

### Description of Equipment and Operation

#### RF Video Camera Systems:

An RF video camera system consists of a handheld or body worn camera which provides a source of video to the system transmitter. The transmitter processes the signal into the proper modulation scheme, at which point the RF signal is broadcast. Multiple local receive antennas with down converters each send their signal to the receiver which will combine/select the various RF paths for the best decoded image. The receiver module then demodulates the RF signal into a copy of the original camera video signal. This process allows the camera to be used anywhere within the desired coverage area within the venue.

#### RF Communications Systems:

Accompanying the operations of RF cameras is a wireless (RF) communications system to facilitate direct bi-directional communications between the camera operator and the broadcast control room. Typically this communications system utilizes narrowband fixed base and mobile LMR type equipment. The base consists of a temporary full duplex transceiver having a hard wire, bidirectional audio connection with the wired production intercom system. This acts as the interface between the wired and OTA users (camera operators). OTA users in turn utilize standard type LMR portable radios worn on their person to both hear the intercom channel and respond as appropriate.

*Note regarding frequency band request for the RF communications portion:* Due to the current 600MHz television repack, and the location in question having been assigned Phase 7



(19 Oct 2019 – 17 Jan 2020) transition, the unoccupied “T-Band” television channels will be changing during the time period of the experimental license should it be granted. The channels/frequencies requested are to ensure that no operations occur in any occupied channel before, during or post phase transition.

#### [Equipment Details – RF Video](#)

The mobile transmitters will be Wave Central AXIS TX Pico transmitters with either Masthead Antennas Model 3237-F0 or Peak Antennas CO 340-4.5-FLX mounted to an existing broadcast portable camera system. This system will supply a DVB-T signal which will be received by a Wave Central AXRX2 Multi-way Diversity COFDM H.264 Receiver using multiple Peak Antennas SCR-340 – 12 Sector antenna.

#### [Equipment Details – RF Communications](#)

The base equipment will be comprised of a Hytera RD982-U2 repeater, with an operational tuning range of 450-520 MHz; either a Scala UBO-470N or Comtelco BS450UWB unity gain antenna; various candidate isolators, hybrid couplers, duplexers, pre-selectors, and channel mask filters to be evaluated as part of this testing cycle.

The mobile equipment will be Hytera PD782U-2 portable two-way radios utilizing the OEM “whip” antenna and various audio accessories.