

## CASE STUDY **Velco**

### CUSTOMER PROFILE

Vermont Electric Power Company (VELCO) operates a transmission system consisting of 650 miles of transmission lines, 44 substations, and 12,000 acres of rights of way to provide electric energy throughout the state of Vermont.

#### Technologies

Management of the extensive transmission network maintained, controlled, and monitored by VELCO is done via an extensive, hybrid, fiber optic/radio communications network. This network is tailored to provide robust, high throughput communications from endpoint to endpoint with low latency in order to support critical communications within the electric energy system.

#### Context of Assignment

VELCO required a three hop Microwave Radio System constructed to interconnect several fiber fed locations over mountainous terrain. This microwave system was to support a year round availability of 99.999% with a minimum throughput of 100 megabits per second. In addition, VELCO required each end of each microwave hop to support 4 x DS-1 and one 10 mbps Ethernet connection.

### COMMDEX SOLUTION

Commdux began the process of deploying the microwave system by performing detailed site walks and developing topographical system maps. Path surveys were performed with a full tower climb for the proposed paths and a detailed path survey report was generated per path. Given the rough terrain of the New England region, it was noted one path in particular required the use of a passive reflector to achieve the desired connectivity between two endpoints.

Taking the path survey information into account, Commdux performed detailed path calculation in order to achieve availability required for this project. In addition, terrain, average clutter, average path clearance, Crane rain region, multipath outage factors were taken into consideration and the best frequency, radio transmitter, and microwave antenna equipment solution was developed for each path. Passive reflector calculations (expected RSL, reflector angle) were performed for the path requiring a repeater to achieve connectivity.

At this point Commdux used the detailed equipment information to complete a detailed structural analysis on each vertical asset. Once the structural analysis passed, Commdux developed a detailed bill of materials and began equipment procurement. Concurrently, FCC frequency coordination and licensing was completed for these paths. Commdux then installed the antennas, radios, lines, and inside plant equipment utilizing specialized field teams to achieve timely and efficient deployment of the microwave radio system.

For each path, installation of tower equipment was performed to factory specifications, guaranteeing a reliable install despite environmental exposure. Coaxial cable lines were thoroughly tested for compliance. Each path was aligned to within 1.5 dB of calculated target Receive Signal Level. Each transmitter was configured and fully tested for functionality, throughput, and latency, guaranteeing uptime of 99.999%. A final acceptance testing procedure was completed and delivered to VELCO.

Commdux developed a detailed scope of work and timeline. This project was initiated in May 2010, and completed in September 2010.

### COMMDEX ROLES

Commdux served as the microwave engineering and construction management lead for the VELCO microwave broadband radio system project. Commdux performed all site walks, technical calculations, equipment ordering, construction scheduling, installation, and testing for the system.