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ITS CENTRAL OFFICE



FDOT Voice Radio Communications and Microwave Network

Presented at the

2013 Transportation Hazards and Security Summit and Peer Exchange,
AASHTO Special Committee Meeting on
Wireless Communications Technology
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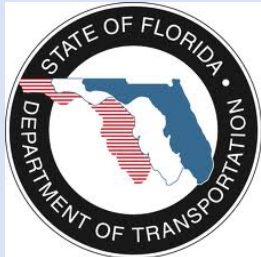


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- State of Florida with FDOT Responsibilities

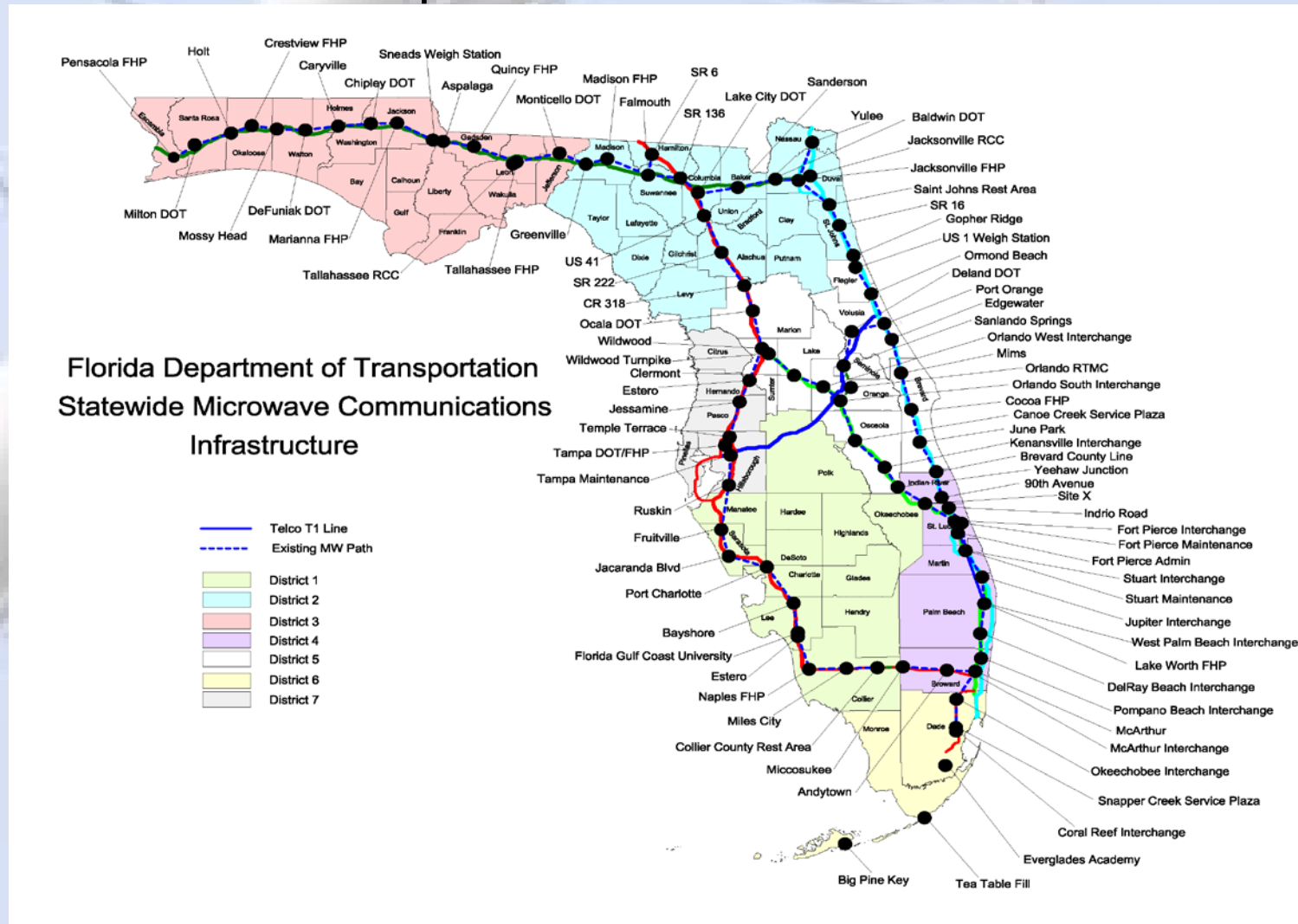


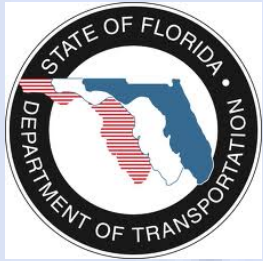


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• FDOT District Map and Statewide Microwave Network





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- FDOT Voice Radio System
 - VHF low-band multicast repeaters within a district
 - Repeaters receive on the same freq but talk on separate freqs
 - Paired frequencies are at 45/47 MHz
 - DCS is used for squelch (both inverted and non-inverted)
 - Midland VHF low-band Basetech II 100 Watt repeaters
 - Separate repeater TX and RX antennas
 - Separate TX and RX filters, changing from cavity to ferrite-cavity
 - Midland VHF low-band Titan 100 Watt mobiles for vehicles
 - JPS Raytheon voters tie district repeaters together with 4-wire circuits over the microwave network
 - Each district has its own multi-cast network
 - Mobile radio programming channel plan includes all districts and is standard statewide



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- FDOT Voice Radio System Continued....





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- FDOT Voice Radio System Continued....
 - In District Maintenance Yards a single VHF HIGH-BAND base station is tied to the low-band voters for local yard use. VHF high-band portables are used by yard personnel. Older low-band desktop remotes being replaced by high-band portables.
 - Vehicular cross-band repeaters are also to permit field personnel to use VHF high-band portables with their vehicle low-band mobile radios
 - FDOT is also investigating the use of RoIP to tie districts together.
 - Testing involves investigating the use of IP Multicasting
 - Amateur radio repeaters are have been tied together (with owner permission) using Raytheon NXU-2A RoIP units
 - Lots of tweaking of COR and PTT inhibit delays have been needed

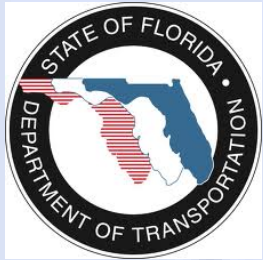


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- FDOT Voice Radio System Continued....
 - Currently FDOT is filling in the coverage holes off the interstates
 - Where necessary FDOT is using new tower sites
 - In some places FDOT is sharing locations with other agencies
 - Using 960MHz licensed links to connect most new sites to the FDOT Statewide Microwave network
 - 4RF Aprisa 960 MHz radios (fractional T1 with 4-wire audio and Ethernet)
 - DX Radio Systems (single audio channel)
 - Kathrein Scala and GD Gabriel Parabolic Antennas
 - Using 4.9GHz for select links
 - Encom Wireless



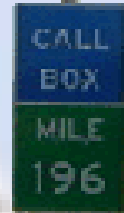
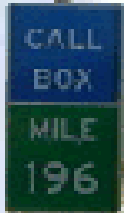


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- FDOT Statewide Microwave Network

- Originally built to support Motorist Aid Call-Box System constructed from the late 70's through the mid-90s. Call-Box system to be retired by end of 2013
- 2300 miles 48Mbps 6GHz Backbone
- Now supports additional applications
- Voice Radio System (LMR)
- Bridge Wind Speed Monitoring System
- Some limited video camera transmission
- TMC to TMC data communications (C-to-C)
- Radio over IP pilot project (multicast)
- Swapping bandwidth with other agencies, e.g. South Florida Water Management





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- FDOT Statewide Microwave Network: Typical Tower





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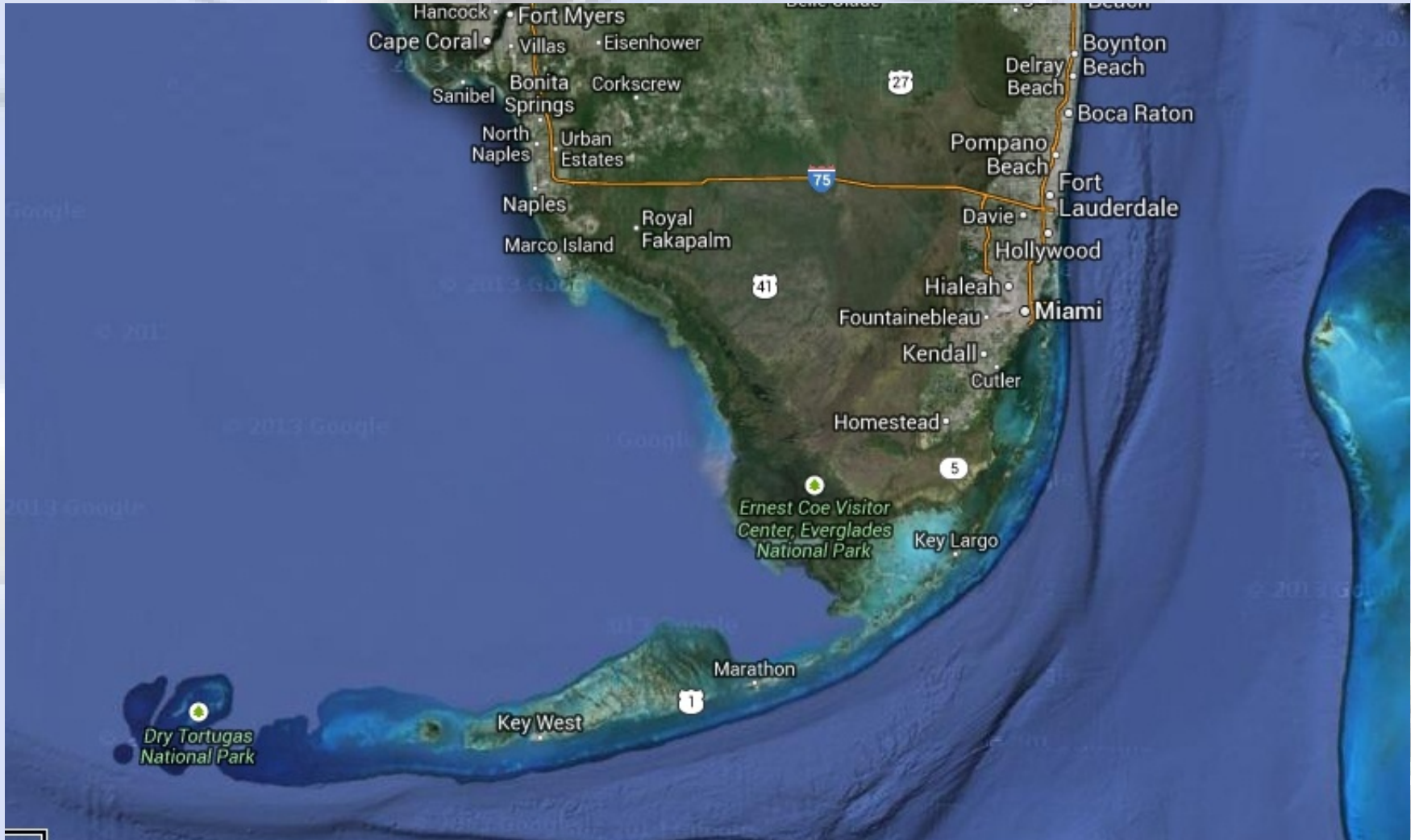
- FDOT Statewide Microwave Network Site Maintenance
 - FDOT is working hard to maintain the network and systematically improve its resiliency
 - All network components are monitored for failures
 - Ongoing maintenance contract with 2HR response/4HR repair
 - Site upgrade projects are ongoing
 - -48VDC Valve-Regulated Lead-Acid battery plants at all sites
 - Generator replacement with 2000G in-ground propane tanks
 - Remote A/C thermostat upgrade
 - Battery Replacement with individual battery cell monitoring using C&D Sageon monitoring product
 - Lightning detection for pre-emptive site power transfer (before being hit) using Astrogenic Systems NEXStorm Lite software and Boltek lightning detector tied to generator ATS

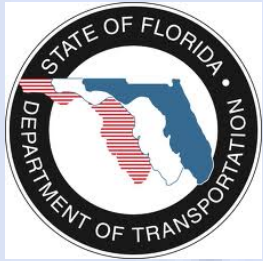


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- FDOT Statewide Microwave Network: Tea Table Key





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