Super WiFi (TV Whitespace) Networking & **Extending Library Services** into the Community

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What is Super WiFi (aka TV Whitespace)

- Spectrum made available with the move of TV broadcasting from analog to digital
- Frequency range in the VHF (174-216 Mhz) & UHF bands (470-786 MHz)
- Unlicensed use under FCC part 15

Uses of Super WiFi/TVWS

- Backhaul facilities (middle-mile)
- Point to point multi-point networking (ex. SCADA)
- Point to multi-point (ex. WISPs)

Characteristics of Super WiFi/TVWS

- Better reach than WiFi networking
  - Penetrates tree canopy and foliage
  - Diffracts around hills and buildings
  - Less attenuation from weather (rain/snow)
  - Long range (up to 10 Km)
- Easy to set up…plug and play
- Cloud and Local Management options

Where does Super WiFi/TVWS fit

- Where other wireless solutions have failed
- Where heavy tree foliage exists
- Hilly areas
- Rural, unserved and underserved areas
- Where towers are prohibited or impractical
- Areas of low population density

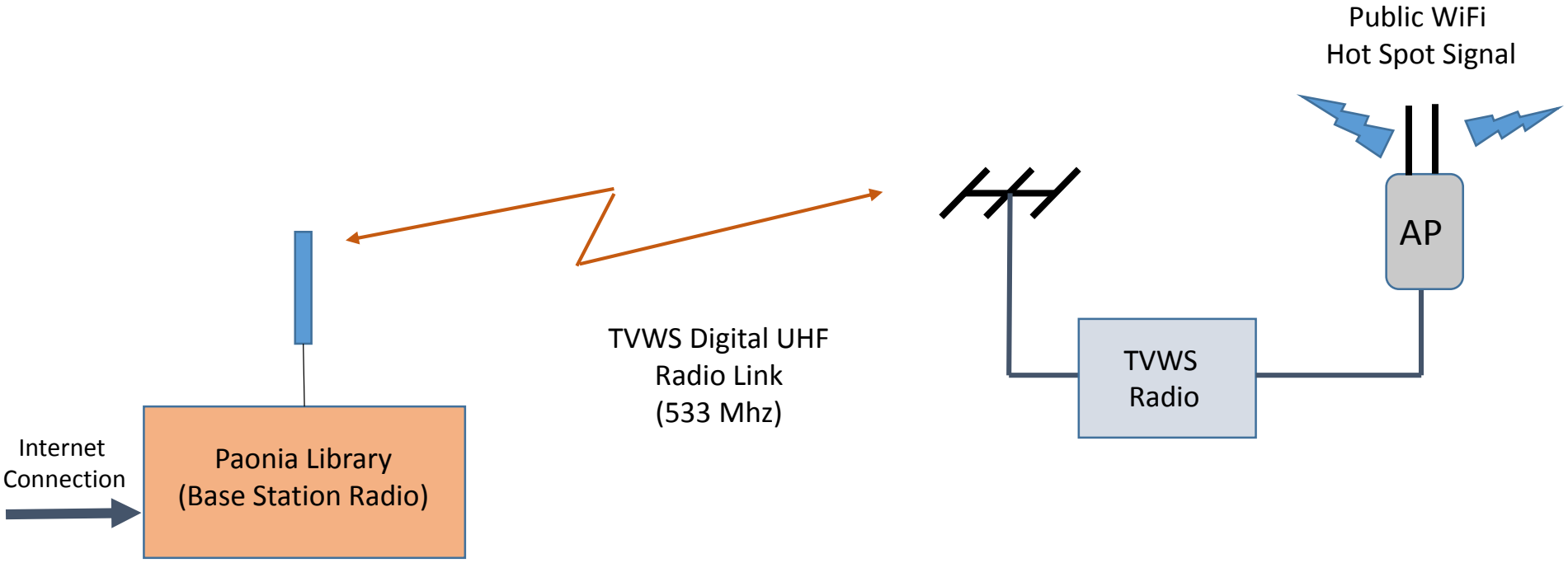
Super WiFi/TVWS enablers

- FCC order issued (Part 15 h)
- Interactive spectrum database established (Spectrum Bridge, iConnectiv, Google)
- Technology enablers
  - Software Defined Radio (SDR) technology supports broadband operation in the VHF and UHF bands and FCC required "Brick wall" filtering
  - High speed multi-core DSP's for advanced modulation (QAM16 used for highest throughput)

Super WiFi/TVWS limitations

- TVWS is just another "tool in the wireless toolbox"
- It is not a replacement for 2.4 and 5 GHz point to multipoint WISP technologies
- Today, it is pricy but this will likely change with time
- Throughput is limited. Typical data rates are up to 10 Mbps in aggregate so you can only support up to 10 clients per base radio for WISP service and up to 40 for SCADA applications

Super WiFi System Architecture



Super WiFi (TVWS) Benefits

- Can punch through tree canopy, buildings and obstructions
- Easy to set up and manage
- Has a range of up to 10 miles
- Uses available TVWS spectrum
- Can support up to 16 Mbps data rates

Hot Spot Locations

- Harvester Building on Grand Ave.
- Paonia Town Park stage

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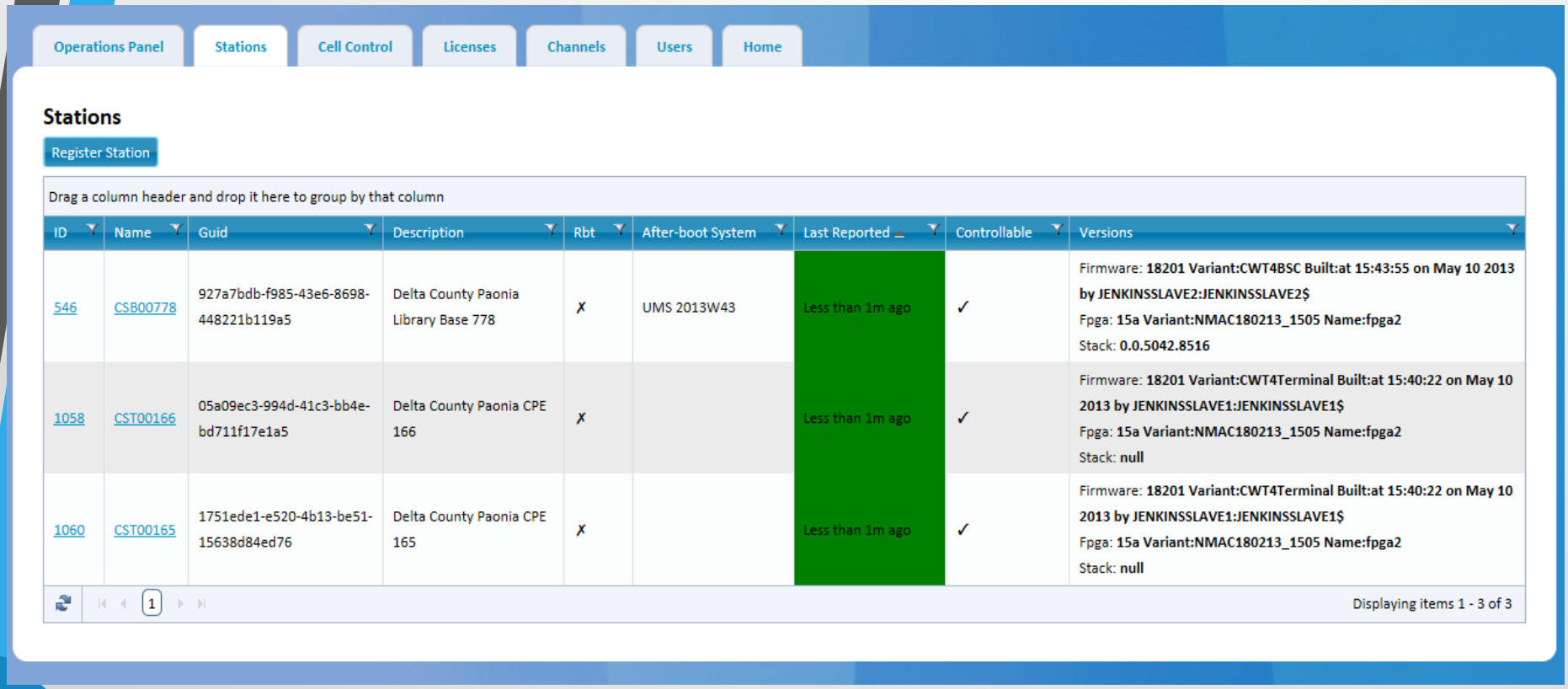
Operations Panel
Stations
Cell Control
Licenses
Channels
Users
Home
Stations
Register Station
Drag a column header and drop it here to group by that column
ID
Name
Guid
Description
Rbt
After-boot System
Last Reported
Controllable
Versions
546
CSB00778
927a7bdb-f985-43e6-8698-448221b119a5
Delta County Paonia Library Base 778
✗
UMS 2013W43
Less than 1m ago
✓
Firmware: 18201 Variant:CWT4BSC Built:at 15:43:55 on May 10 2013 by JENKINSSLAVE2:JENKINSSLAVE2$
Fpga: 15a Variant:NMAC180213_1505 Name:fpga2
Stack: 0.0.5042.8516
1058
CST00166
05a09ec3-994d-41c3-bb4e-bd711f17e1a5
Delta County Paonia CPE 166
✗
Less than 1m ago
✓
Firmware: 18201 Variant:CWT4Terminal Built:at 15:40:22 on May 10 2013 by JENKINSSLAVE1:JENKINSSLAVE1$
Fpga: 15a Variant:NMAC180213_1505 Name:fpga2
Stack: null
1060
CST00165
1751ede1-e520-4b13-be51-15638d84ed76
Delta County Paonia CPE 165
✗
Less than 1m ago
✓
Firmware: 18201 Variant:CWT4Terminal Built:at 15:40:22 on May 10 2013 by JENKINSSLAVE1:JENKINSSLAVE1$
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Stack: null
1
Displaying items 1 - 3 of 3

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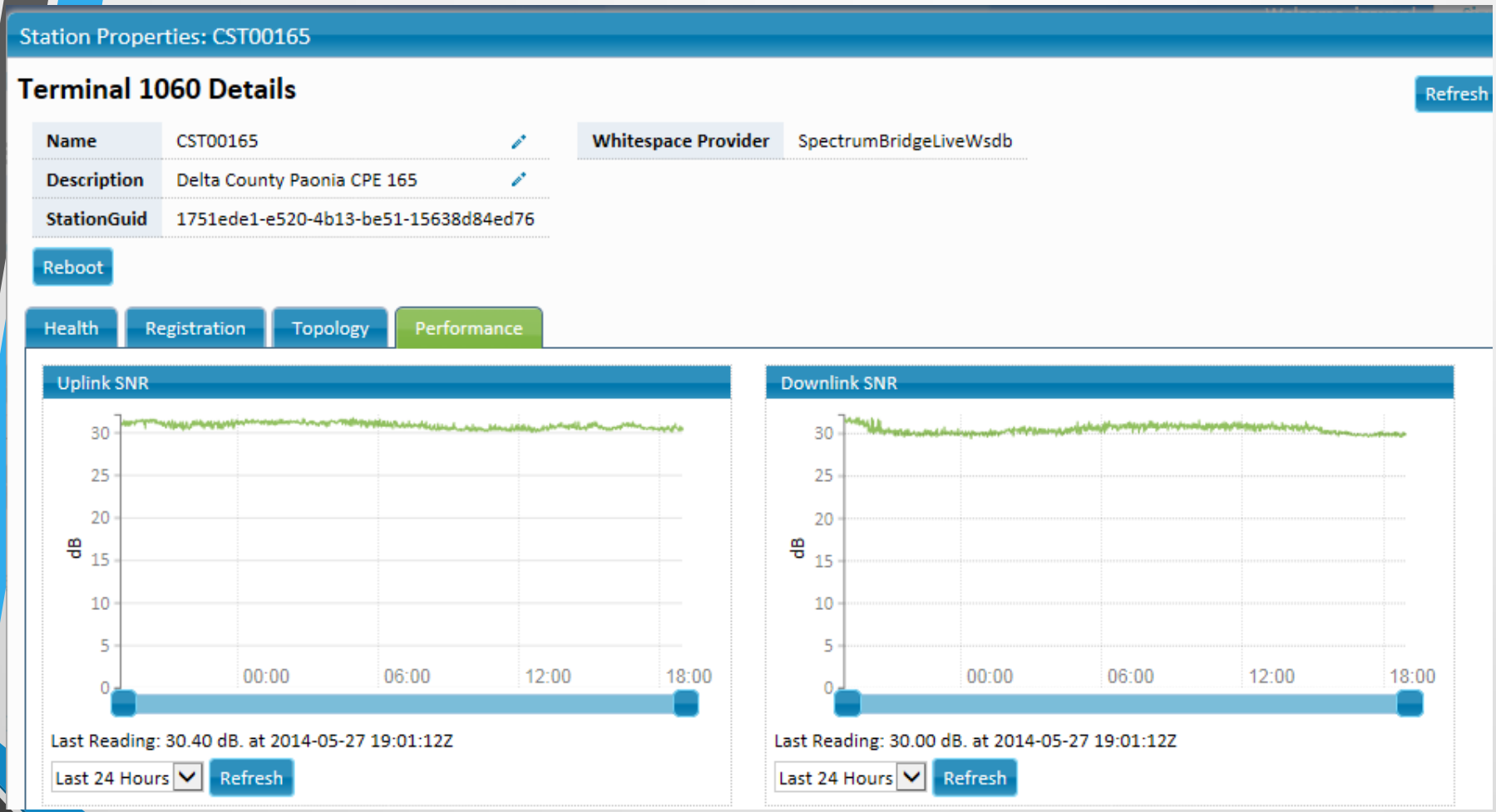
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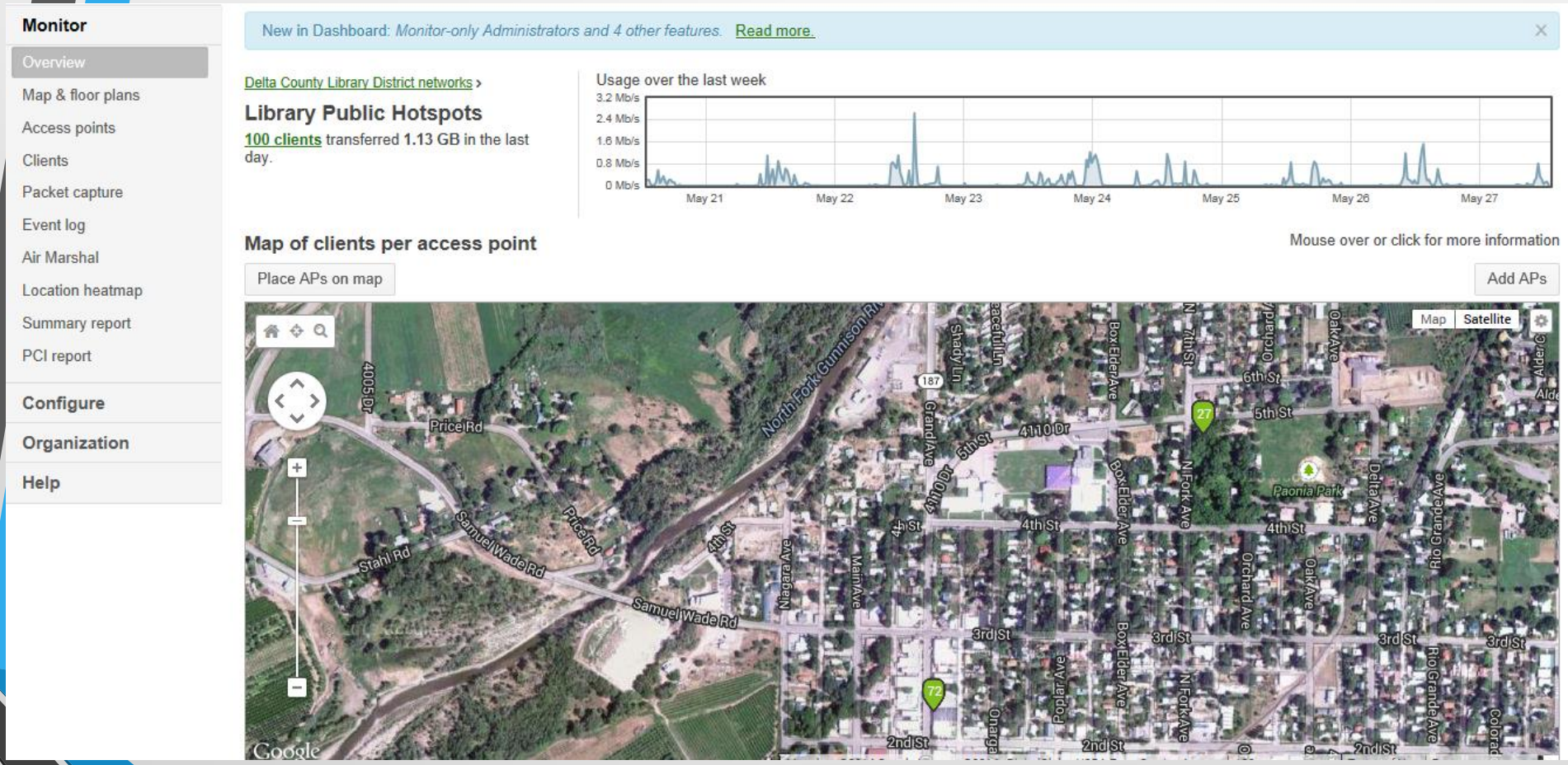
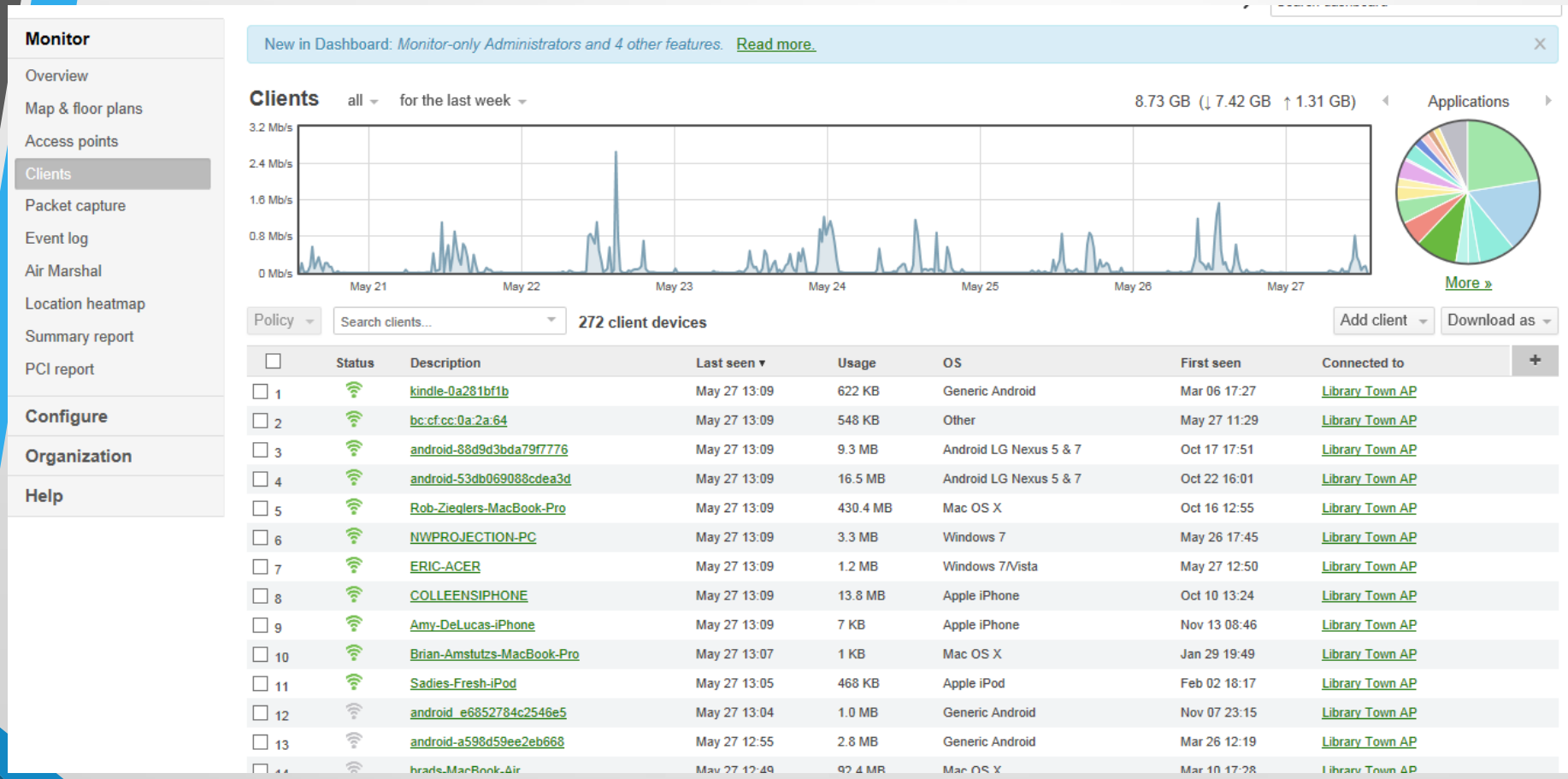
Terminal 1060 Details
Refresh
Name
CST00165
Description
Delta County Paonia CPE 165
StationGuid
1751ede1-e520-4b13-be51-15638d84ed76
Whitespace Provider
SpectrumBridgeLiveWsdb
Reboot
Health
Registration
Topology
Performance
Uplink SNR
dB
30
25
20
15
10
5
0
00:00
06:00
12:00
18:00
Last Reading: 30.40 dB. at 2014-05-27 19:01:12Z
Last 24 Hours
Refresh
Downlink SNR
dB
30
25
20
15
10
5
0
00:00
06:00
12:00
18:00
Last Reading: 30.00 dB. at 2014-05-27 19:01:12Z
Last 24 Hours
Refresh

Meraki Dashboard



Meraki Dashboard



Our topography – view from the roof

Omni-directional Base Antenna

Paonia Library

Base-station Radio

Carlson Rural Connect Client Radio

Client radio installation in NEMA box

Client Log Periodic Antenna

Homebrewed Access Point Bracket

So, why is a library doing this??

Delta County is:

- Rural and poor
- The size of Rhode Island
- Has only 30,000 residents
- Has huge areas of underserved and unserved territory
- Incumbent service providers don't invest because of the above conditions

In Delta County, the Libraries are the Centers of the Community. In many cases, we are the only place where people can go to get on the internet to apply for a job, file a tax return, seek information, do e-mail, browse social media and do the myriad of things that you can only do on the internet!

Feel free to contact me !

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