Affordable & Reliable Wireless for Video Surveillance

A new standard in reliable wireless video surveillance
The Market for Wireless Backhaul in CCTV

- Fiber/Copper installation is expensive
- Time consuming for physical install
- Often cities/municipalities require permits and therefore more time
- Residential and commercial property security is a big play
- Currently served by small/medium CCTV installers/integrators
Trenches – Is not always Smart

Fixed Wireless can lay a high speed broadband foundation at a fraction of cost and time
The Market for Wireless Backhaul in CCTV

- WiFi used in early days but did not serve well due to interference, distance limitations
- Typical customers moved away from WiFi backhaul for cameras
- ePMP presents a compelling solution
- Question:
  - How do we penetrate the market to establish ePMP is a leading solution for CCTV backhaul?
Overview

• ePMP
  – Solutions
  – Key features
  – Modes of Operation
  – Air Fairness Scheduler
  – Rate Adapt
  – Quality of Services (QoS)
The Complete ePMP Solution

GPS Sync AP
GPS Sync AP Lite

Unsynchronized Radios

High Performance
GPS-Synchronized MAC

- Precision Timing
- Dynamic Tx Range w/ AutoTx Power Control
- 3 Level QoS w/ Auto VoIP Prioritization

5 GHz & 2.4 GHz

Sector Antennas
90 degree Sector
120 degree Sector

High Gain Radios

2.4/5 GHz

2.4 GHz

5 GHz

2.4 GHz Force 200

2.4 GHz Force 200

5 GHz Force 110 PTP

5 GHz Force 200

5 GHz & 2.4 GHz

2.4/5 GHz

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Modes of Operation

GPS SYNC/TDD MODE

- GPS sync allows frequency reuse to avoid self interference
- Three different DL / UL ratio settings. 30/70 ratio specific to video surveillance
- Scalable to multi-site, multi-network CCTV networks

FLEXIBLE

- Dynamic, Adaptable
- Best for localized AP deployments and PTP/PMP links where non self interfering systems do not exist

LOW LATENCY PTP

Low latency ePTP mode to carry video traffic after multiple hops
Air Fairness Adaptive Scheduler

- Air Fairness” Scheduler Prevents a few “Bad” SMs from dragging down the entire Access Point
- Scheduler makes sure the Bad SM’s gets the consistent throughput to make sure the video is consistent
- Resource Allocations based on Time, not Throughput
- Highly differentiated from WiFi
Rate Adapt Algorithm

- According to ITU-R recommendations video streaming should have packet loss less than 3%.
- For video compression, the I-frame packet loss has more impact to video than the B and P-frame. (single B-frame IP packet loss only impacts 1 frame. But single I-frame packet loss affects 14 frames.)
- ePMP provides consistent high throughput with advanced rate adapt mechanism that is targeted to keep zero frame loss even in highly congested areas.
- eFortify capability in ePMP maintains high performance constantly by handling external interference.
- ePMP advanced rate adapt mechanism with reduced packet loss is best in class for video with compression.
Quality of Service (QoS)

- SM Priority: Normal, High, Low
- L2 Markings: VLAN, CoS, EtherType, MAC
- L3 Markings: IP, DSCP
ePMP Bridge in a Box

- Pre-packaged ePMP Force 180 point to point link
- Nothing extra and minimal RF and IP knowledge needed
- Pre-programmed to connect out of the box and extend links to:
  - CCTV backhaul
  - Building to building connectivity
  - WiFi Backhaul
  - And many more
- Interference resiliency built in with proprietary protocol

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
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<tbody>
<tr>
<td>Wireless Standard</td>
<td>ePMP proprietary protocol. Supports longer ranges, lower latency and performance. Optional WiFi mode</td>
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<tr>
<td>Interface wired</td>
<td>RJ45/Port x4, Ethernet</td>
</tr>
<tr>
<td>Functions</td>
<td>Prioritization, WEP, Traffic prioritization using quality of service (QOS)</td>
</tr>
<tr>
<td>Power</td>
<td>24-56V PDC (100V PDC power supply provided)</td>
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<tr>
<td>Transmit power</td>
<td>Up to 30 dBm</td>
</tr>
<tr>
<td>Environmental</td>
<td>Outdoor IP15, -20 to +55°C, 50-60% humidity</td>
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<tr>
<td>Antenna</td>
<td>16dBi Integrated antenna</td>
</tr>
<tr>
<td>Mount</td>
<td>Flexible pole mount. Supports diameter 1-3&quot;</td>
</tr>
<tr>
<td>Security</td>
<td>AES256 Data Encryption and Radius Based Authentication</td>
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F180 and CCTV deployments
F180 and CCTV deployments
# ePMP vs standard wireless for Video Surveillance

<table>
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<th>Std Wireless</th>
<th>ePMP</th>
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<tr>
<td>Contention based transmission. Wifi based interference wreaks havoc on the video feed</td>
<td>Deterministic transmission combined with advanced rate adaption.</td>
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<tr>
<td>Limited distance due to protocol limitation</td>
<td>Up to 40 mile range and beyond with higher gain accessories</td>
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<tr>
<td>Standard adaptive mechanism relying on channel switching to avoid interference</td>
<td>Advanced rate adapt mechanism and ARQ to minimize packet loss and thus frame loss</td>
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<td>Standard WiFi based QOS</td>
<td>Custom QOS and bandwidth allocation mechanism for point to multipoint systems.</td>
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<tr>
<td>Outdoor rated systems not price competitive</td>
<td>Designed from the ground up for outdoor deployment and cost conscious. As little as $200 MSRP for a 3~5KM link</td>
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<tr>
<td>Scalability limited due to protocol limitation</td>
<td>Highly scalable with deterministic behavior and throughput for each camera and link</td>
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