

Cambium Networks cnMedusa™ Technology Offers Maximum Performance during Peak Demand

“We have serviced downloads up to 118 Mbps during peak customer usage. I would expect these customers to be more than satisfied with their currently uncapped Internet service from the PMP 450m access point.”

- ROB REIF,
PRODUCTION
MANAGER, PIXIUS
COMMUNICATIONS

Challenge

PROVIDING WIRELESS BROADBAND

service to customers in Kansas and Missouri for over 16 years, Pixius was feeling pressure on their network capacity.

“Our Colwich tower was equipped with two PMP 450 radios in each 60 degree sector,” said Rob Reif, Production Manager, Pixius Communications. “These radios served a combined total of 92 customers, drawing a combined 45 Mbps download rate with Frame Utilizations measuring up to 95%. About 48% of our customer traffic is related to video streaming, which typically peaked between 9 PM and 11 PM each evening.”

Video traffic is significantly increasing in their network, so to ensure customer satisfaction, Pixius provides rate plans to allow >3 Mbps downloads. “Presently, over 50% of our customer base is on rate plans offering <1 Mbps downloads,” said Reif. “This is mostly due to older and constrained Access Point technologies. Our plan for cnMedusa is to improve the available bandwidth at constrained tower locations, enabling us to improve end user satisfaction while also increasing revenue from customer upgrades to larger bandwidth rate plans.”

The most critical requirement in achieving this objective is sector capacity. In order to exceed the value proposition threshold established in the current deployment (i.e. 2 radios per 60 degree sector), the PMP 450m cnMedusa technology had to demonstrate a minimum of double the capacity relative to the current PMP 450 technology.

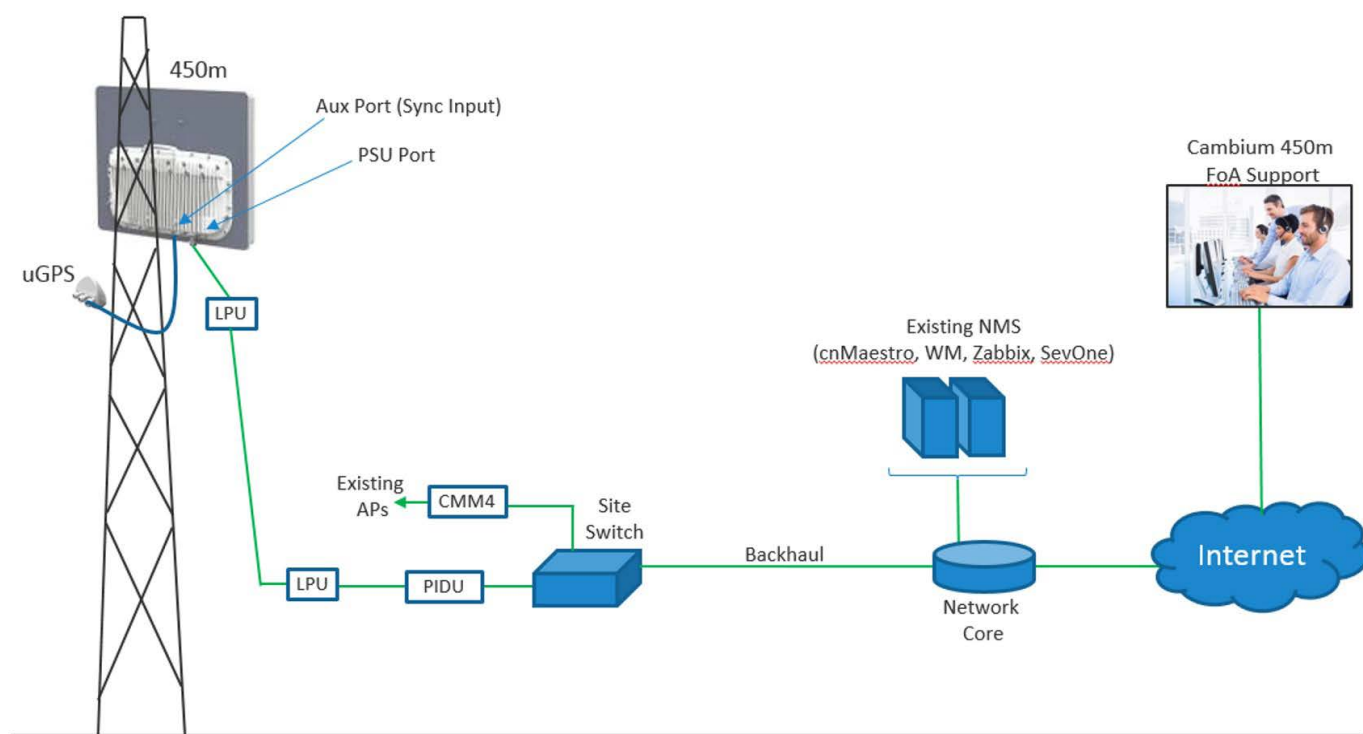
Solution

PIXIUS DEPLOYED A SINGLE PMP 450M ACCESS POINT (AP)

servicing a sector with 112 live customers for the test.



High Level Block Diagram of setup



PMP 450m Access Point with cnMedusa Massive MU-MIMO technology

Frequency	5.150 - 5.925 GHz
Throughput	More than 400 Mbps in a 20 MHz channel
Synchronization	GPS Synchronization

PMP 450 and 450i Subscriber Modules

Frequency	2.4, 3.5, 3.65, 4.9 - 5.9 GHz
Throughput	125 Mbps in a 20 MHz channel
Synchronization	GPS Synchronization

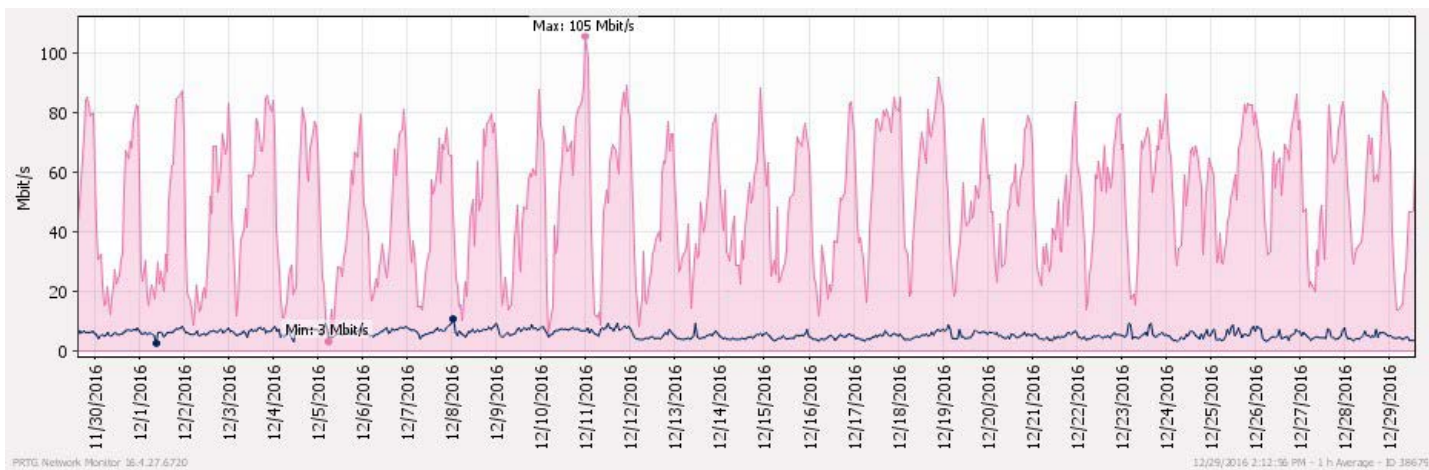
Results

PIXIUS USED CAMBIUM'S FREELY AVAILABLE LINKPLANNER NETWORK DESIGN SOFTWARE TO DEVELOP THE

network. "Prior to installation, we imported the targeted customer population of 112 end users into the LINKPlanner software," said Reif. "Since we previously serviced this sector with two 60° sector radios (PMP 450), we utilized color codes to control the initial Subscriber Module (SM) population to emulate the 60° sector. This enabled us to validate the PMP 450m performance with the same population of SMs that were previously served by the dual PMP 450 APs. After completion of the baseline validation, we removed the color code restriction and opened the cnMedusa access point up to service all SMs in the full 90° sector."

Specific to the PMP 450m beta test, Pixius had about 113 SMs that have registered to the AP. Pixius' total customer base exceeds 7,000 customers that are primarily serviced via Cambium wireless technologies.

Over a three month time frame, about 50% of customer traffic was related to video streaming (e.g. Netflix, HTTP streaming). The remainder was distributed between gaming, social media and miscellaneous web-related traffic.



“After the PMP 450m initial installation, we expected to service about 111 customers with a total demand approaching 50 Mbps downloads,” said Reif. “We peaked at 113 SMs on this AP but are presently loaded at 109 customers. We also removed all rate limitations with the intention of finding the PMP 450m limitation for this number of subscribers. Currently, we’ve serviced downloads up to 118 Mbps during peak customer usage. I would expect these customers to be more than satisfied with their currently uncapped Internet service from the PMP 450m access point.”

Higher capacity also increased spectral efficiency. With this dramatic improvement on a single AP servicing one sector, the results of upgrading the entire 360° coverage from a tower show the real value of the PMP 450m. As an example, consider the spectral efficiency from one tower, with two arrays of six PMP 450 Access Points, against the performance of a single array of four PMP 450m APs. The comparison of total throughput delivered is 4X the spectral efficiency:

	APs	Spectrum (with frequency re-use)	Throughput	Spectral Efficiency
PMP 450	12	12 AP x 20 MHz = 120 MHz	12 AP x 100 Mbps = 1.2 Gbps	10 bps/Hz
PMP 450m	4	4 AP x 20 MHz = 40 MHz	4 AP x 400 Mbps = 1.6 Gbps	40 bps/Hz

Pixius is currently moving forward with plans to install PMP 450m APs as they have successfully exceeded their 2x minimum bandwidth threshold. With the present configuration, they have experienced download rates up to 118 Mbps with 110 customers. This is an improvement from the dual radio (PMP 450) installation where >90% frame utilization consistently delivered 50 Mbps downloads across 92 customers. Pixius will continue to collaborate with Cambium’s engineering team to enhance PMP 450m operational features and metrics in order to maximize the overall performance and efficiency of our Cambium based wireless network.

Next Steps

“WE FULLY EXPECT TO DELIVER SIGNIFICANTLY LARGER RATE PLANS TO OUR CUSTOMERS, WITH STRATEGIC campaigns intended to upsell target customers [to higher rate plans] and add new customers. We also plan to leverage cnMedusa to transition our equipment away from legacy technologies - such as the PMP 100 products - that are currently installed throughout our production network.”

“We currently plan to install PMP 450m technology onto ten tower locations in 2017. We’re also considering a new market build out, which will result in deployment of the PMP 450m in over 20 additional tower sites.”

About Pixius Communications

Pixius.com

Pixius serves customers in Kansas and Missouri from our headquarters in Wichita, Kansas. We help our community grow by providing fast, reliable Internet service to businesses and residences. We provide comprehensive solutions to our customers to meet their Internet and technology needs, where traditional services fail or do not reach.

Why Pixius Communications chose Cambium Networks

- **High capacity throughput** – meeting bandwidth demand during peak periods
- **Spectral Efficiency** – making the most of limited spectrum
- **Scalability and frequency re-use** – growing the network with expanding subscriber base
- **LINKPlanner software** – planning efficient and successful installations