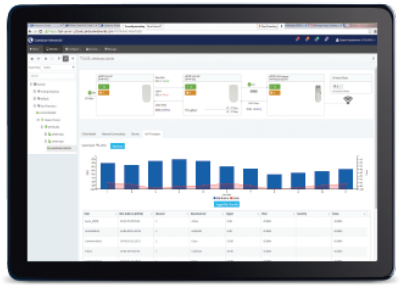
CAMBIUM NETWORKS

World-class Wireless Networks

cnPilot™ R190W

E600

E501S



cnMaestro™

Wi-Fi

*e*PMP™ 2000

PMP 450m

PTP 700

Distribution Access & Backhaul

Product Update: PTP 550

AGENDA

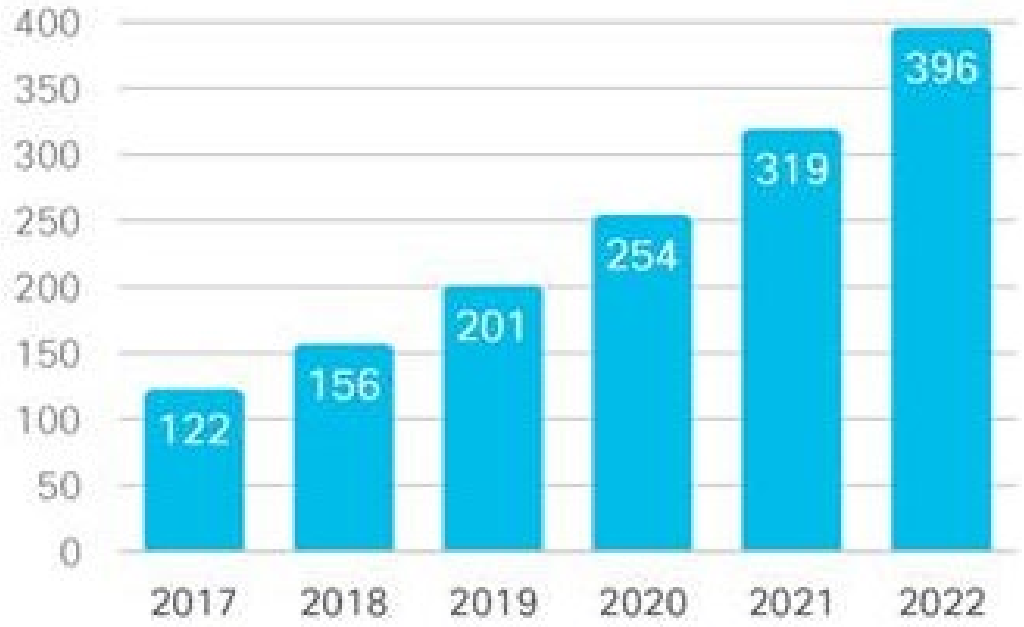
- Why build PTP 550 ?
- PTP550 Product Overview
  - Channel Bonding
  - Interference Mitigation
- PTP 550 in the wild
  - Customer deployment 1 : Argentina
  - Customer deployment 2 : Croatia
  - Customer deployment 3 : Malaysia
  - Customer deployment 4 : India
  - Customer deployment 5 : United States
- Roadmap Ahead

What is the main goal with PTP550? What is the vision behind this product?

- Data consumption is growing at 25% every year
- Interference Mitigation: 5 GHz Band getting increasing polluted

Focused solution for customers who require a 1+ Gigabit backhaul option in 5 Ghz

Year	Global Internet Traffic
1992	100 GB per day
1997	100 GB per hour
2002	100 GB per second
2007	2,000 GB per second
2017	46,600 GB per second
2022	150,700 GB per second

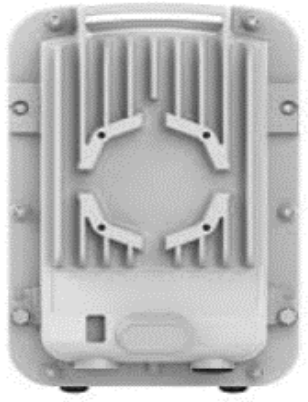


Cambium Networks™

PTP 550

- 1.4 Gbps Capacity
- Dynamic Channel Selection
- Asymmetric non adjacent Channel Bonding
- Asymmetric Modulation
- SFP Port
- ARQ Protocol
- Small form factor and Metal Enclosure

PTP 550
INTEGRATED

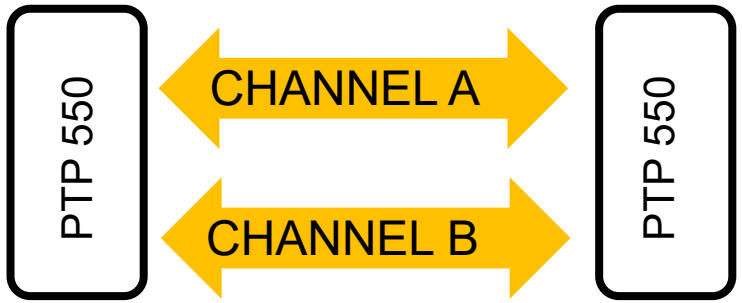


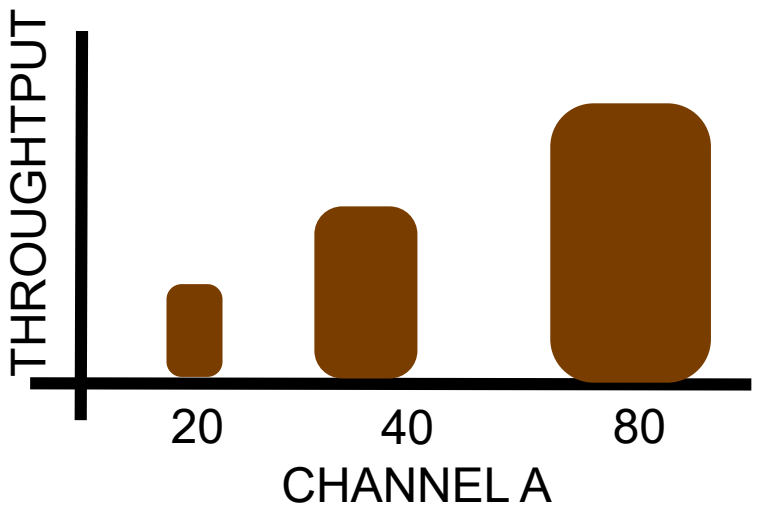
PTP 550
CONNECTORIZED

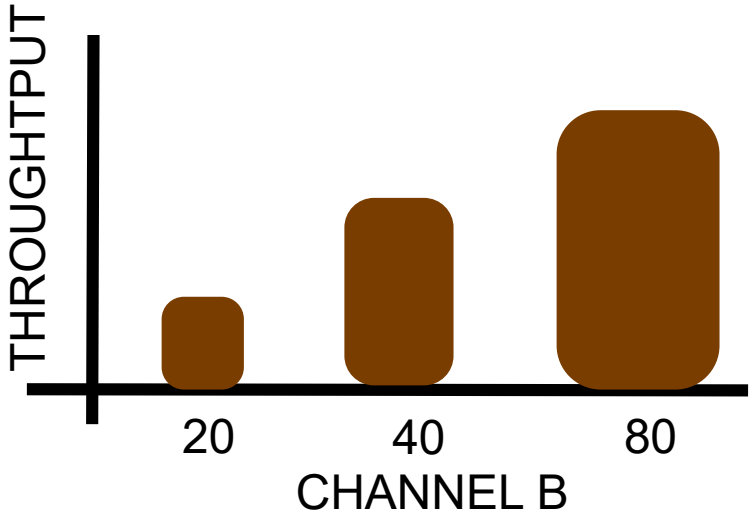
PTP 550 KIT:

1. 1 Radio (Connectorized or Integrated)
2. 1 AC Power : 30 W /56 V
3. 1 Mounting Bracket
4. 1/0 Line Cord

CHANNEL BONDING: EXPLAINED

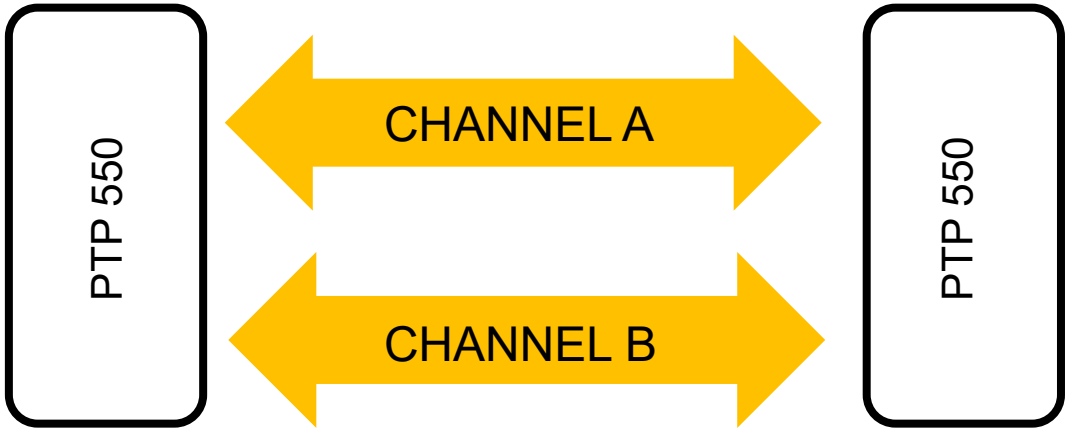






CHANNEL A	CHANNEL B	EXAMPLE SCENARIO	THROUGHPUT
20	20	BAD NETWORK	350 Mbps
20	40	ONLY ONE CLEAN CHANNEL	500 Mbps
80	20	ONLY ONE CLEAN CHANNEL	850 Mbps
40	40	TWO CLEAN CHANNEL	700 Mbps
40	80	TWO CLEAN CHANNEL	1 Gbps
80	80	TWO FULL CLEAN CHANNEL	1.4 Gbps

RESILIENT & AGGRESSIVE CHANNEL PLANNING

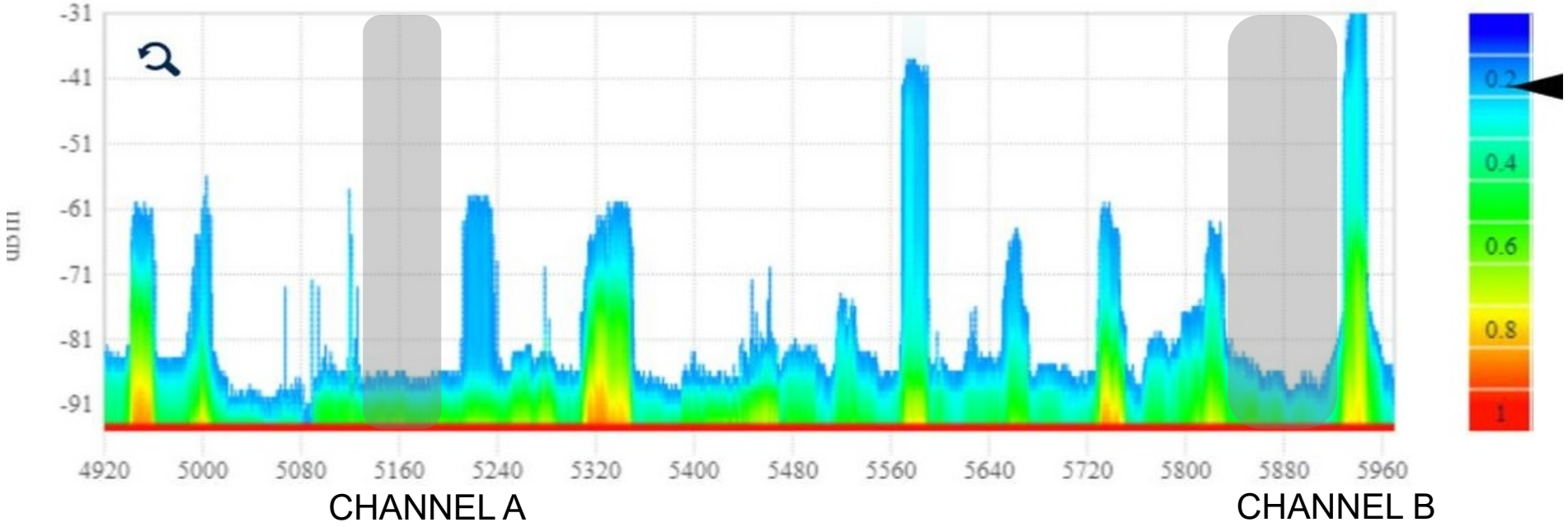


CHANNEL A: SAFE and STABLE
Reliable throughput to customers

CHANNEL B: AGGRESSIVE
Strive for better throughput for customers

20 MHz STABLE

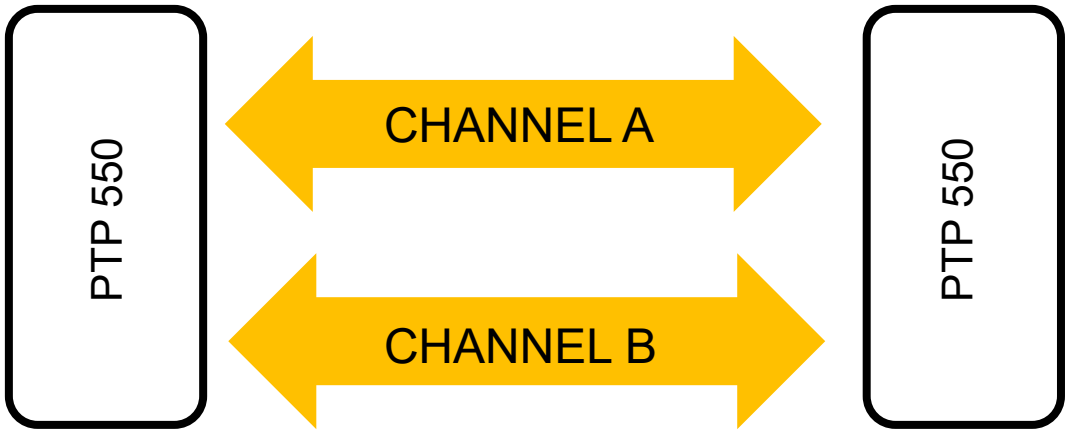
40 MHz AGGRESSIVE



CHANNEL A

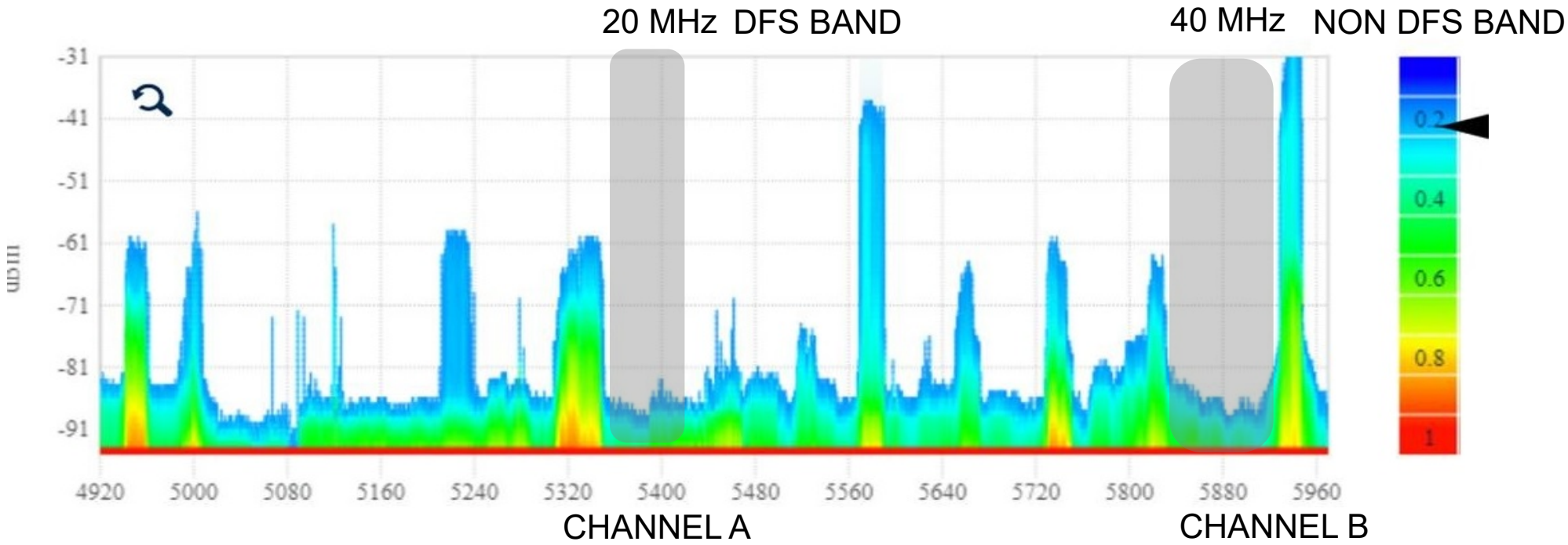
CHANNEL B

DFS AND NON-DFS BAND UTILIZATION PLAN



CHANNEL A: DFS BAND

CHANNEL B: NON-DFS BAND



Interference Mitigation

- **ARQ (AUTOMATIC REPEAT REQUEST)**

ARQ stands for which means if IP packet are dropped between PTP550 retransmit is re-transmitted again instead of the just dropping the packet and moving along. This becomes vital when using during VoIP or low latency application such as Gaming

- **LOAD BALANCING DURING CHANNEL BONDING**

PTP550 always optimized based on current RF condition, it load balancing algorithm takes into account lot of input including channel bandwidth, number of flows, RSSI

- **ADAPTIVE MCS**

PTP550 reacts extremely fast to RF environment, its ability to skip modulation rate MCS means it's always ready to react at moment's notice

Customer Deployment: Argentina

Link Details

Country : Argentina

2x20 MHz, TDD 30/70

2 x 31 dBi dishes

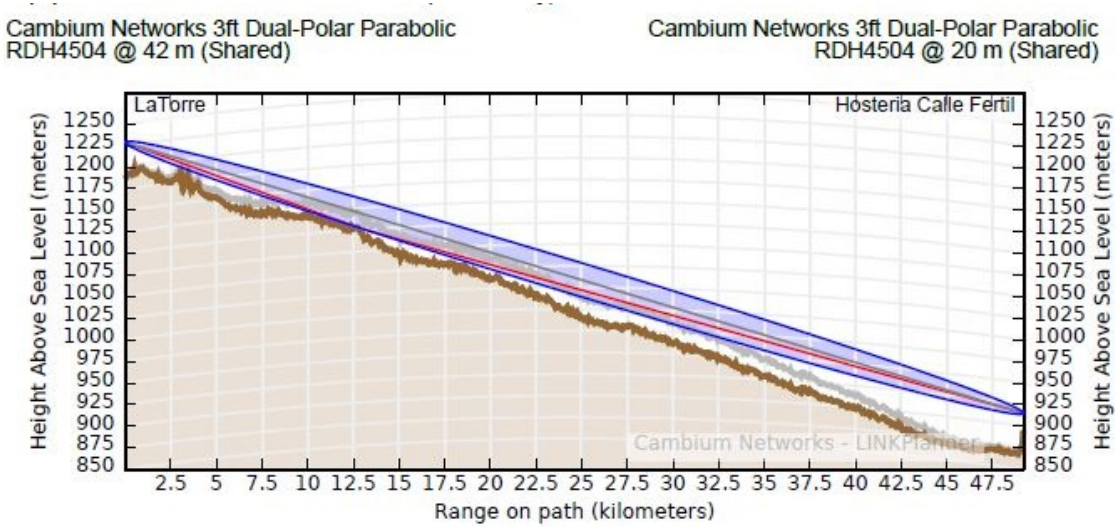
Link Distance: 49 km (30 miles)

Link Performance:

UL: 148 Mbps

DL: 69 Mbps

217 Mbps in 40 MHz Channe



Customer Deployment: Croatia

Link Details

Country : Croatia

Link Distance: 5 km (3.1 miles)

2x40 MHz, TDD 75/25

2 x 29 dBi dishes

Link Performance:

UL: 169 Mbps

DL: 490 Mbps

650 Mbps in 80 MHz Channel

Customer Deployment: India

Link Details

Country : India

Link Distance: 18 km (11 miles)

1x20 MHz

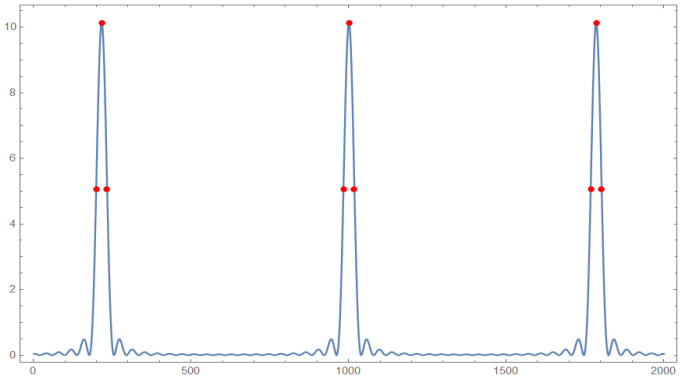
2 x 29 dBi dishes

Performance

UL: 72 Mbps

DL: 72 Mbps

144 Mbps in 20 MHz Channel



Pulse Interference

Customer Deployment: United States

Link Details

Country : United States

Link Distance: 2.25 km (1.4 miles)

2x20 MHz

2 x 24 dBi dishes

Performance:

UL: 161 Mbps

DL: 159 Mbps

Total Throughput: 320 Mbps

Customer Deployment: Malaysia

Link Details

Country : Malaysia

Link Distance: 9 km (5.5 miles)

2x80 MHz

2 x 28 dBi dishes

High Noise environment

Performance

UL: 77 Mbps

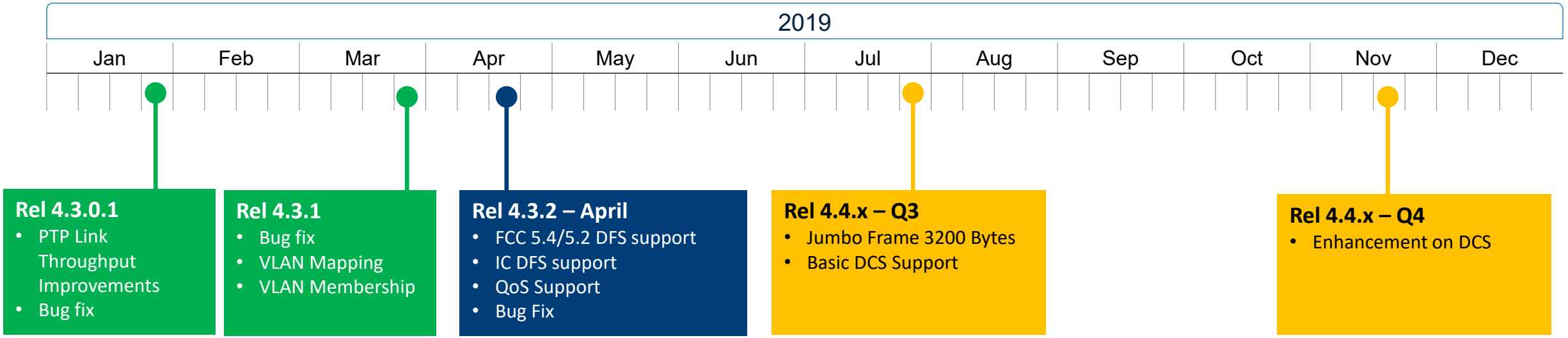
DL: 348 Mbps

Total Throughput: 425 Mbps

Compilation of Customer field results

Countries	Channel Bandwidth	Distance	Antenna Gain	Interference Level	Throughput	Spectral Efficiency
Argentina	2x20: 40 MHz	49 km	31 dBi	Medium	217 Mbps	5.4 bit/Hz
Croatia	2x40: 80 MHz	5 km	29 dBi	Low	650 Mbps	8.1 bit/Hz
India	1x20: 20 MHz	18 km	29 dBi	High	144 Mbps	7.2 bit/Hz
Malaysia	2x80: 160 MHz	9 km	28 dBi	Severe	425 Mbps	2.6 bit/Hz
United States	2x20: 40 MHz	2.25 km	24 dBi	Low	320 Mbps	8 bit/Hz

PTP 550 Roadmap



Completed	Gate 2
Committed	Gate 7
In Planning	Gate 10
Evaluating	Gate 13
Candidate	Gate 15

THANK YOU