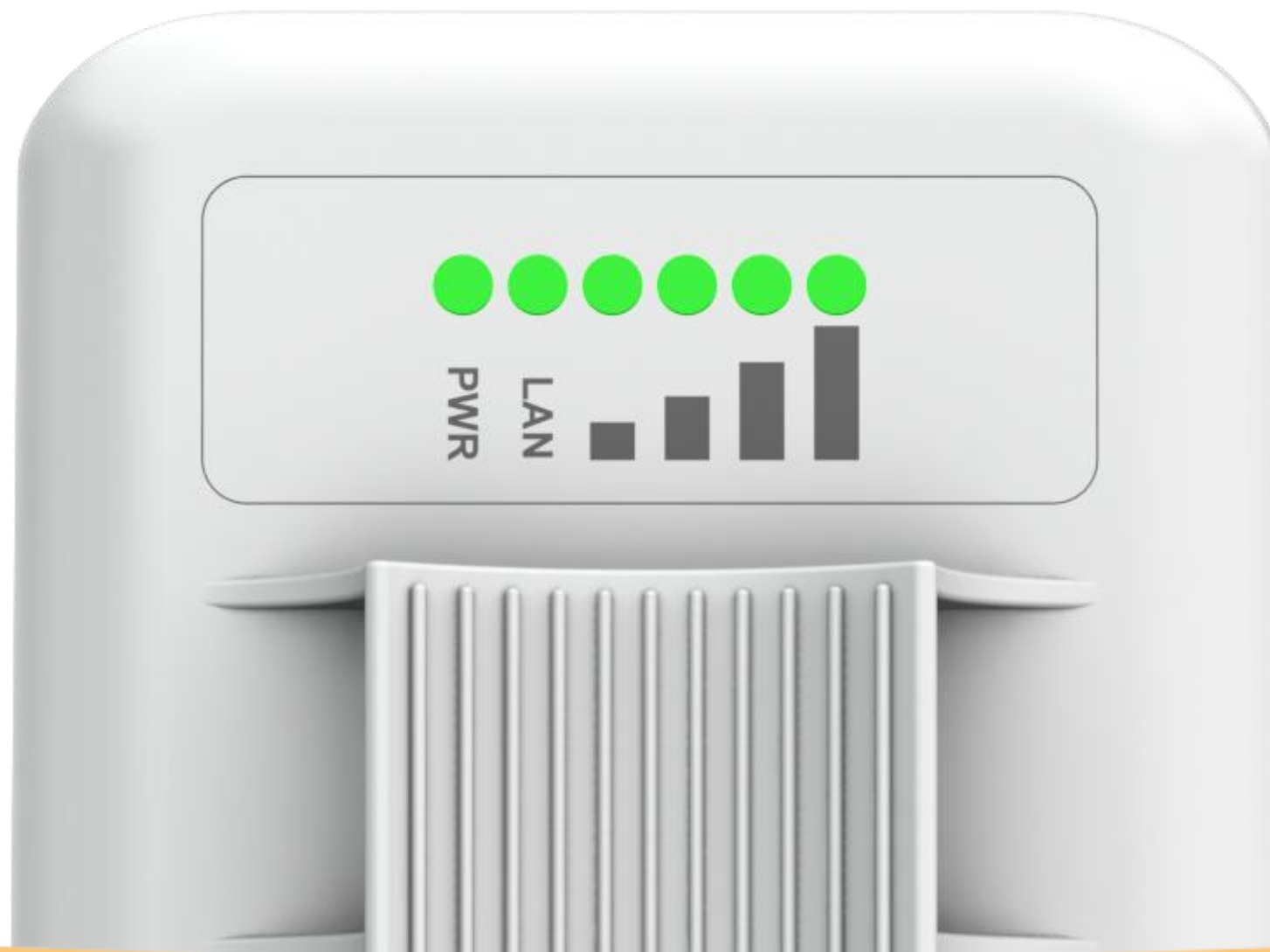




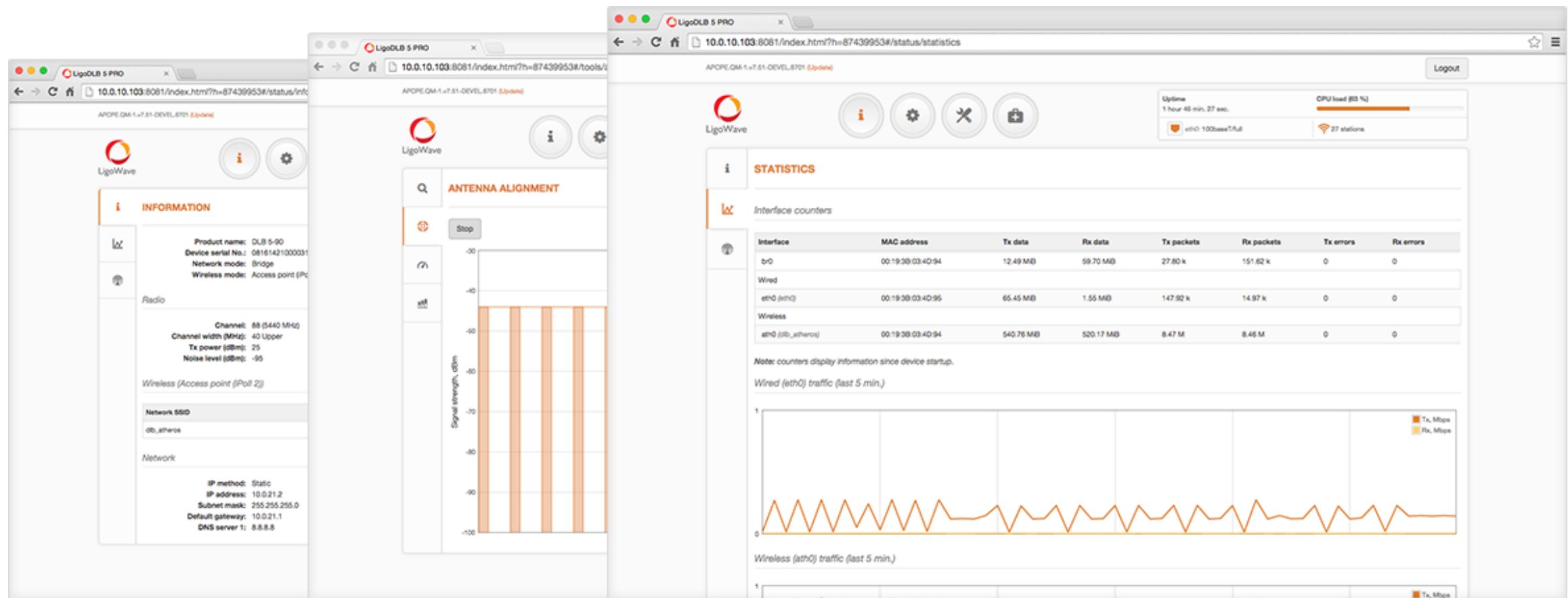
# DLB series





## New more advanced CPU

- Better performance:
- High throughput - 170 Mbps
- High PPS rate - 90000
- Narrow channel support (5, 10 MHz)
- More RAM improves multiple client performance (64)
- More Flash allows storing a secondary recovery firmware image



# DLB OS

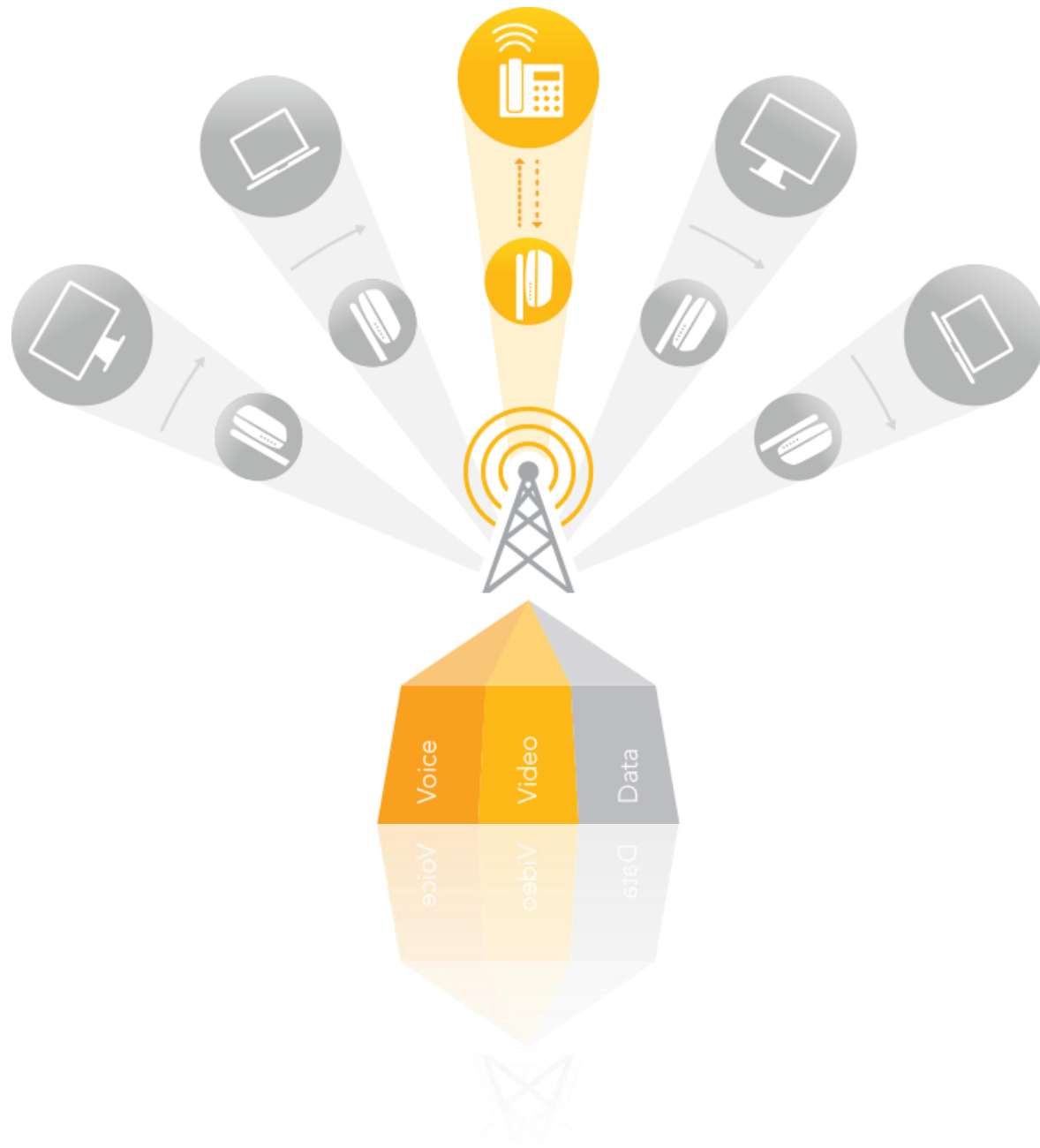
- Improved iPoll protocol
- HTML 5 based responsive design UI
- Full APC series functionality and compatibility in iPoll mode
- QoS

## New features:

- IPv6 bridge and router support
- SSDP and bonjour device discovery options
- Flexible traffic shaping

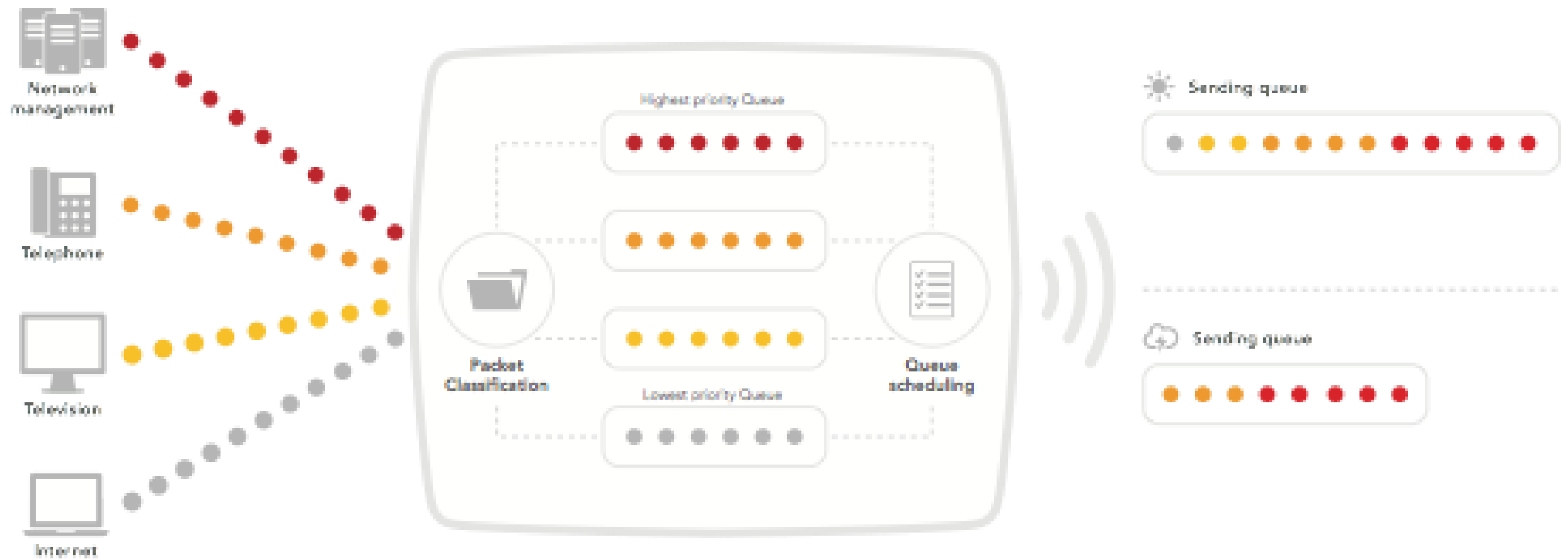


# iPoll 2



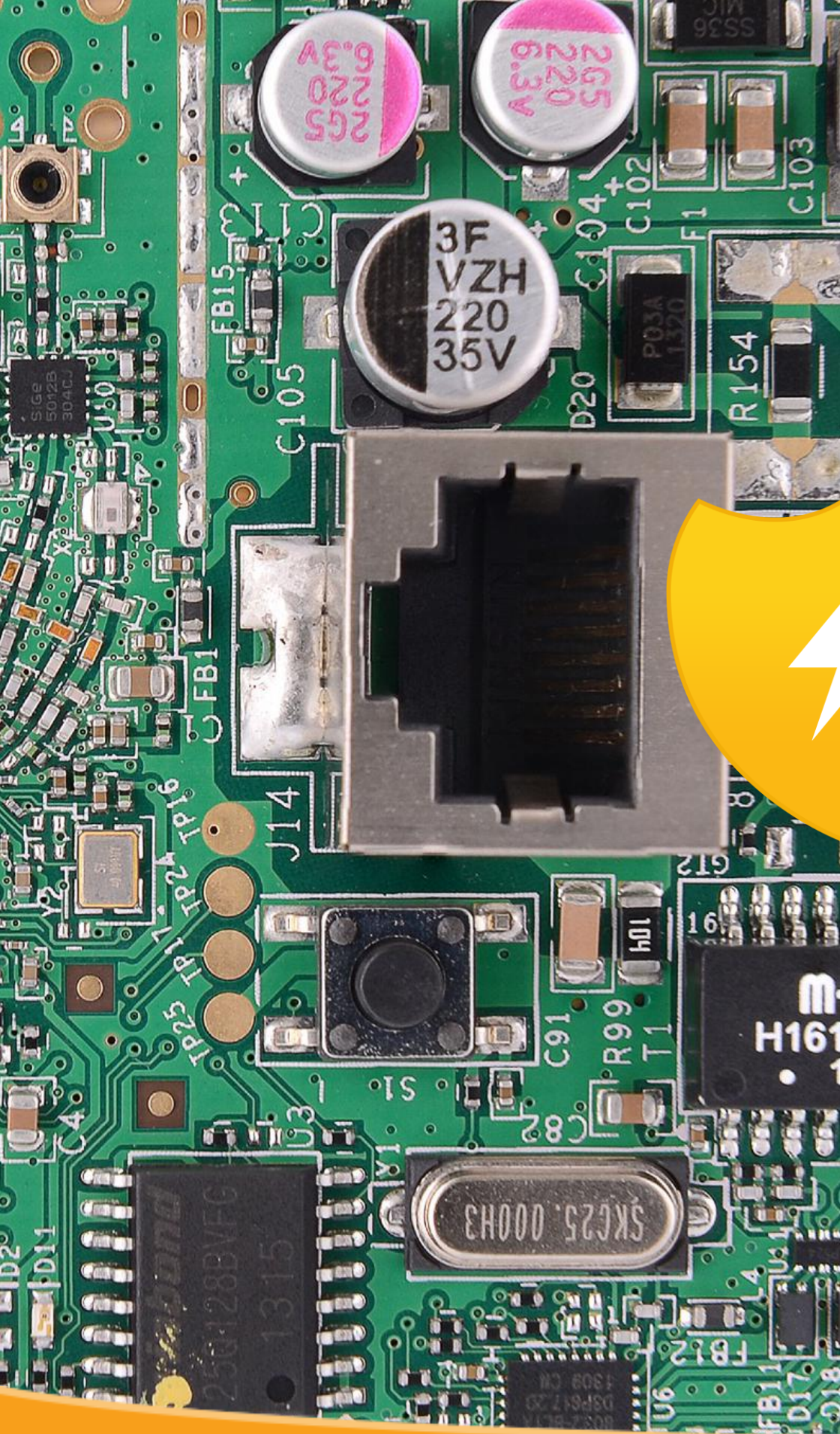
- Backwards compatible with APC series devices (fw v7.0)
- Higher throughput (170 Mbps) and PPS (90,000)
- Ensures reliable packet delivery
- Guarantees even throughput per CPE even in a congested environment
- Utilises the radio channel efficiently despite the station activity difference
- Ensures low latency by controlling packet retransmission and acknowledgements
- Checks and divides CPE's into different activity groups

# QoS



- 4 queues for different traffic types
- Strict policy based
- Packet prioritisation by VLAN/CoS (L2) and IP/ToS/DSCP (L3) marks
- Multiple services support (data, voice, video etc.)





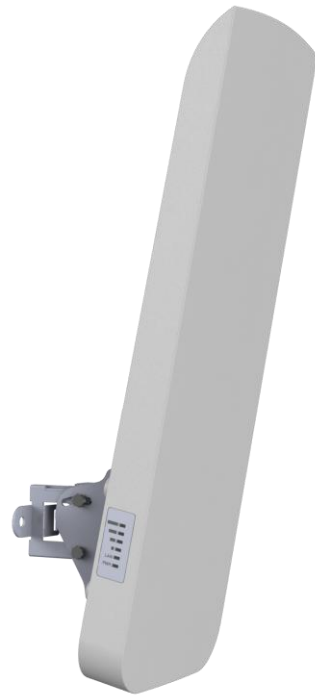
# Integrated surge protection

3 kV line to ground and 1 kV line to line protection allows operating and improves stability in a harsh weather environments and unstable electrical installations

# DLB 2/5 GHz radio platform

- Atheros AR9341 chipset (500 MHz)
- 64 MB DDR2 RAM
- 16 MB SPI flash
- 2.402 to 2.492/ 5.150 to 5.850 GHz frequency range support
- Output power 31/ 29 dBm
- Surge: 3 kV line to ground and 1 kV line to line
- 1 x 10/100 Base-T Ethernet port
- -40 to +65 C temperature range
- 12-24V power supply range

# DLB 5 GHz products



	DLB 5-90	DLB 5	DLB 5-15 (new)	DLB 5-15B
Antenna gain	18 dBi	N/A	15 dBi	15 dBi
Antenna angle	90	N/A	30	40
IP rating	IP-65	IP-66	IP-65	IP-66
Mounting	Wall/ pole	Wall/ pole	Pole	Wall/ pole



# DLB 5 GHz products



	DLB 5-20	DLB MACH 5	DLB ECHO 5
Antenna gain	20 dBi	23 dBi	15/ 27 dBi
Antenna angle	16	7	6
IP rating	IP-66	IP-67	IP-67
Mounting	Wall/ pole	Wall/ pole	Pole

# DLB 2.4 GHz products



	DLB 2-90	DLB 2	DLB 2-9 (new)	DLB 2-9B	DLB 2-14
Antenna gain	16 dBi	N/A	9 dBi	9 dBi	14 dBi
Antenna angle	90	N/A	60	60	34
IP rating	IP-65	IP-66	IP-65	IP-66	IP-66
Mounting	Wall/ pole	Wall/ pole	Pole	Wall/ pole	Wall/ pole

# DLB 2-9/5-15



- Best MSRP in the market
- Small form factor (14.1 x 8.8 x 4 cm)
- 9 dBi gain antenna on a 2 GHz model, 60 degrees angle
- 15 dBi gain antenna on a 5 GHz model, 30 degrees angle
- Pole mounting bracket



# Size and antenna gain comparison



16 dBi antenna  
**Thickness: 6 cm**



13 dBi antenna  
**Thickness: 6 cm**



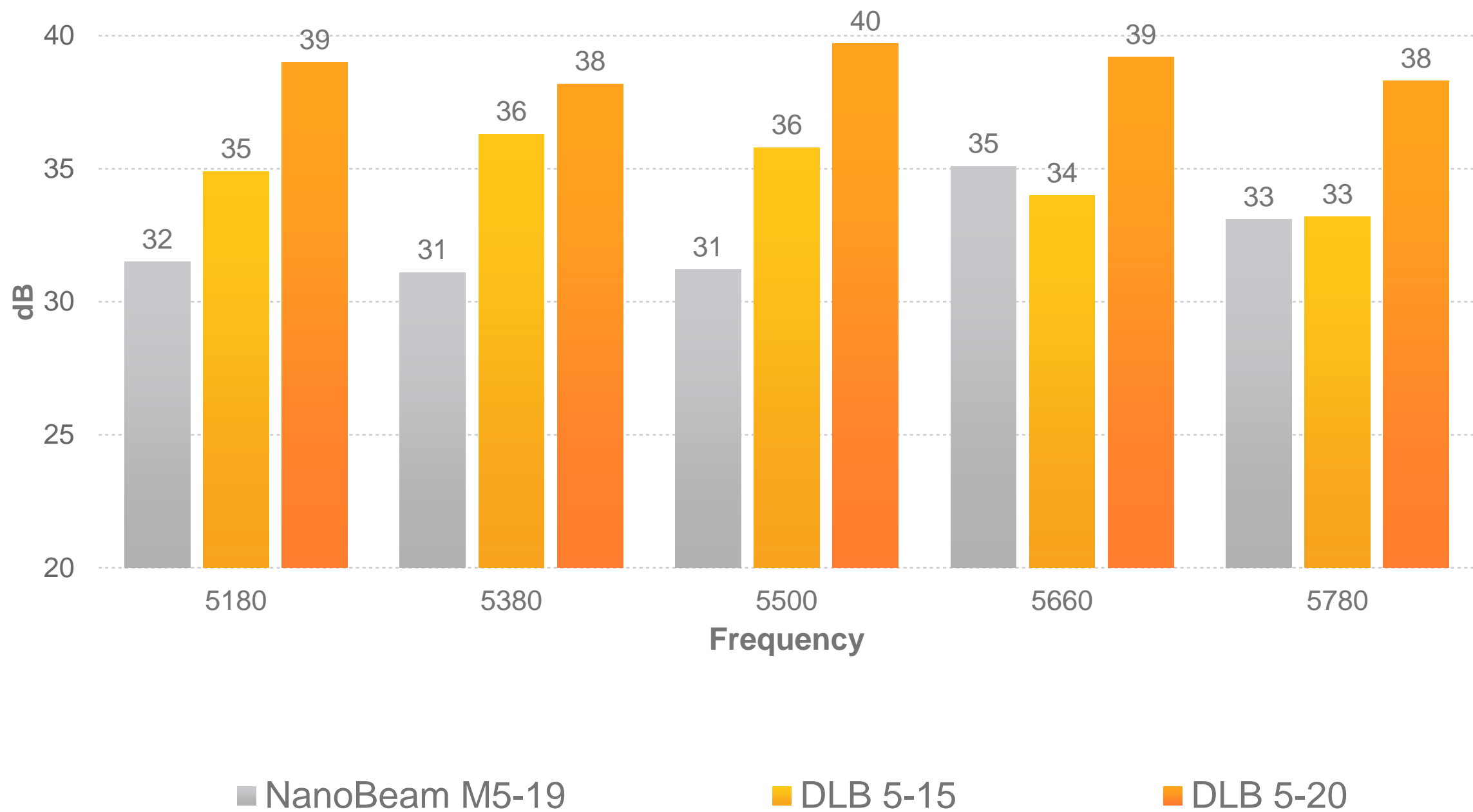
15 dBi antenna  
**Thickness: 4 cm**

# DLB 5 GHz products



	DLB 5-15	Nanobeam m5-19	DLB 5-20
Max radio power	29 dBm	26 dBm	29 dBm
Antenna gain	15 dBi	19 dBi	20 dBi
EIRP	44 dBm	45 dBm	49 dBm

# EIRP graph

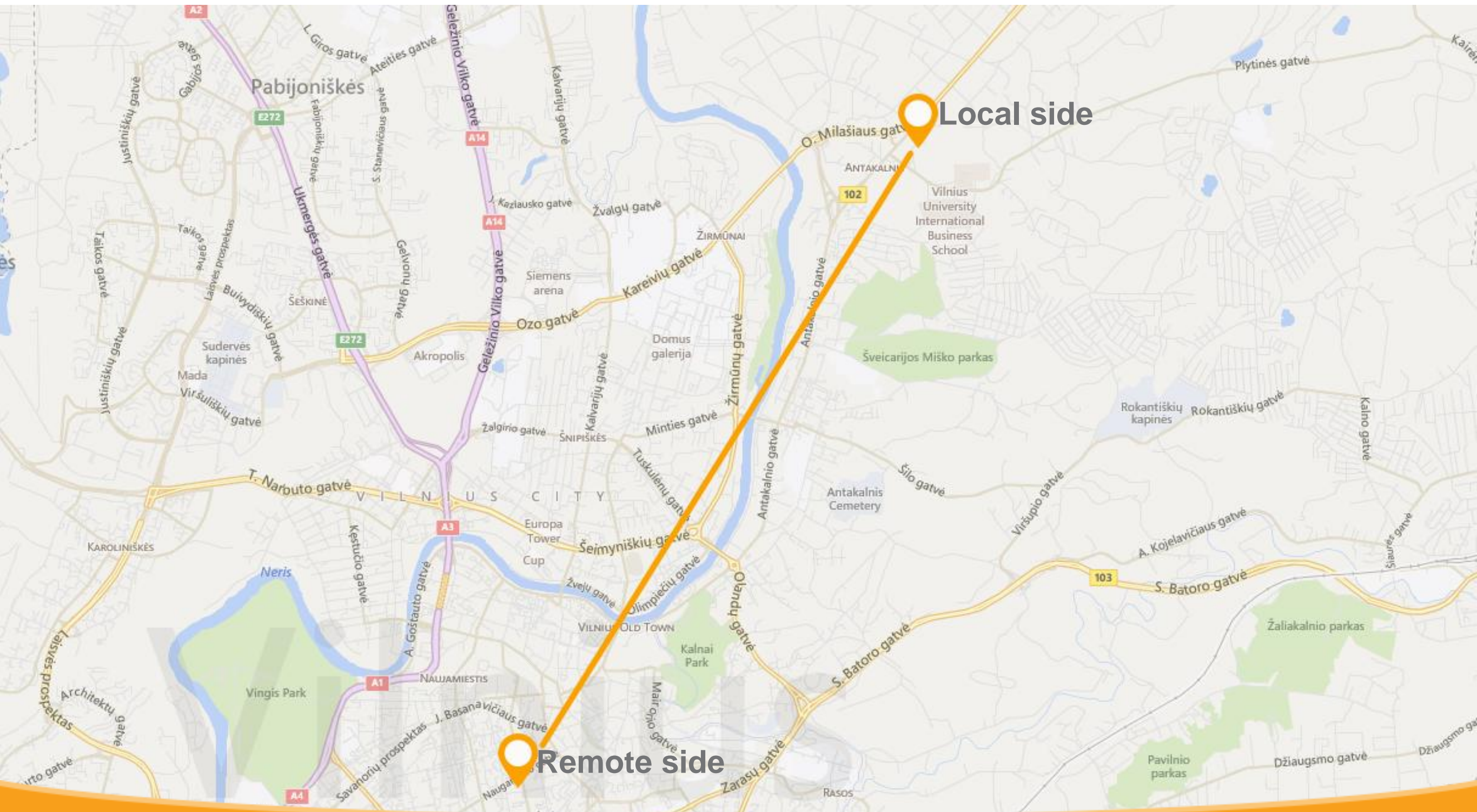


EIRP measured at highest (MCS7 data rate)



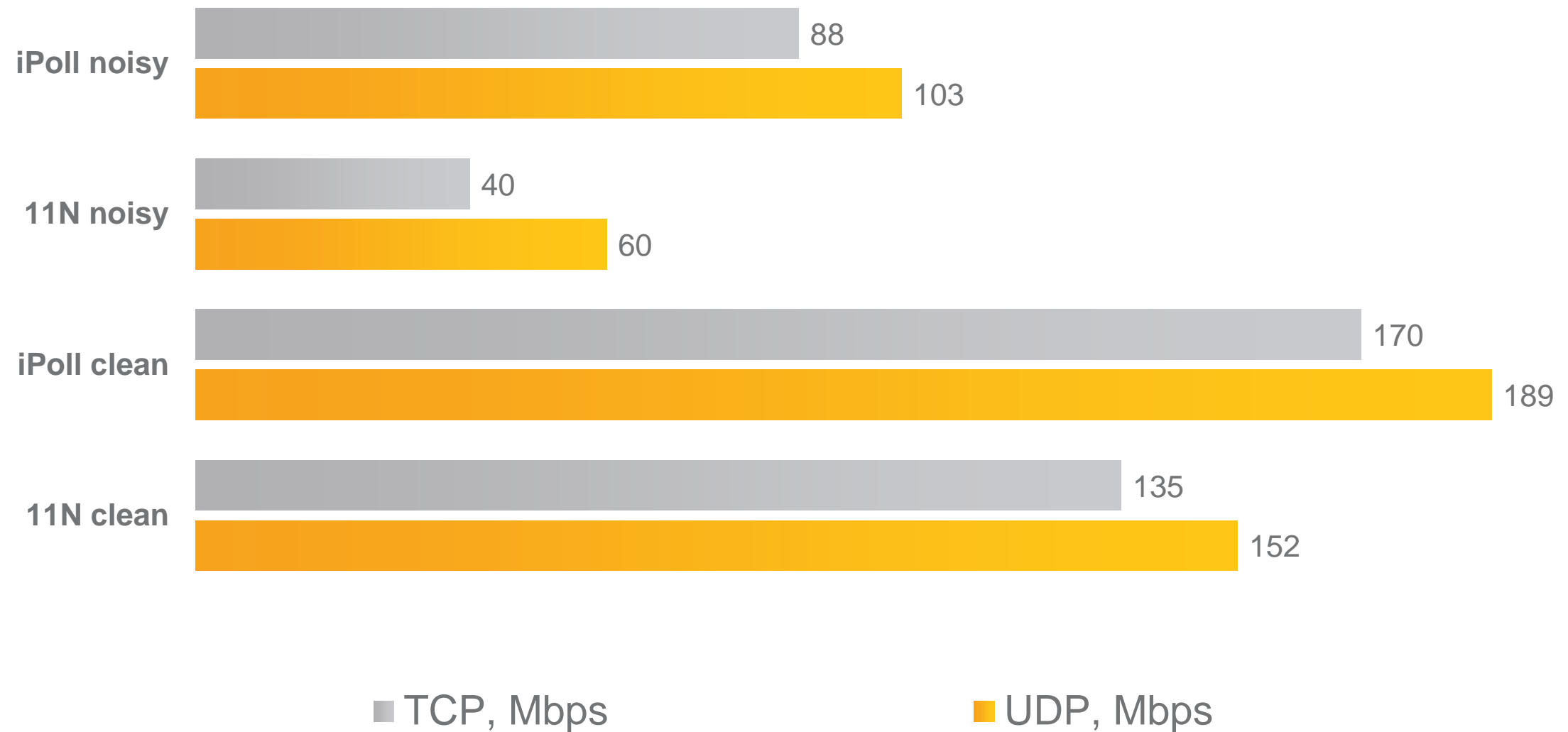
# Test reports

7 km DLB ECHO 5 test in Vilnius



# Test reports

7 km DLB ECHO 5 test in Vilnius



# EchoBracket



- Flexible mount for the ECHO 5 radio
- Turns the device into one of the smallest CPEs in the market
- IP-67, metal enclosure, high output power, 15 dBi integrated antenna
- Comes free with a purchase of every ECHO 5 during the introduction
- Short range PTP, video surveillance CPE



# Test reports

250 meter PTMP test setup in Vilnius



# Test reports

## 250 meter PTMP test setup in Vilnius



**Deliberant APC**

**LigoDLB**

**Ubiquiti**

**Mikrotik**

	Deliberant APC	LigoDLB	Ubiquiti	Mikrotik
Base-station	1 x APC 5M-90	1 x DLB 5-90	1 x Rocket M5 Ti + Sector 90 Ti	1 x RB/912UAG-5HPnD + UBNT sector 90
CPE	31 x APC 5M-12	28 x DLB 5-15	30 x NanoBeam M5-16	30 x SXT 5nD r2

# Test reports

## 250 meter PTMP test setup in Vilnius

	PPS	TCP 1/n active, Mbps	TCP 10/n active, Mbps	TCP n/n active, Mbps	UDP 1/n active, Mbps	UDP 10/n active, Mbps	UDP n/n active, Mbps
APC, n = 31	40	76	166	178	80	189	191
DLB, n = 28	<b>80</b>	91	<b>168</b>	<b>180</b>	102	<b>190</b>	<b>192</b>
UBNT, n = 30	26	<b>106</b>	102	104	<b>129</b>	98	88
Mikrotik, n = 30	70	69	84	98	105	89	109



# THANK YOU

[www.LigoWave.org](http://www.LigoWave.org)