WiFi4ALL | LigoWave | CASE STUDY

Successful network upgrade with LigoDLB ac devices

Wireless Internet service provider Linkfor, operating in Belgorod region, is one of the first WISPs in Russia who started using LigoWave point-to-multipoint products in their network on a large scale. Linkfor has over 4000 commercial clients in total and 1255 of those clients are connected using LigoWave devices.

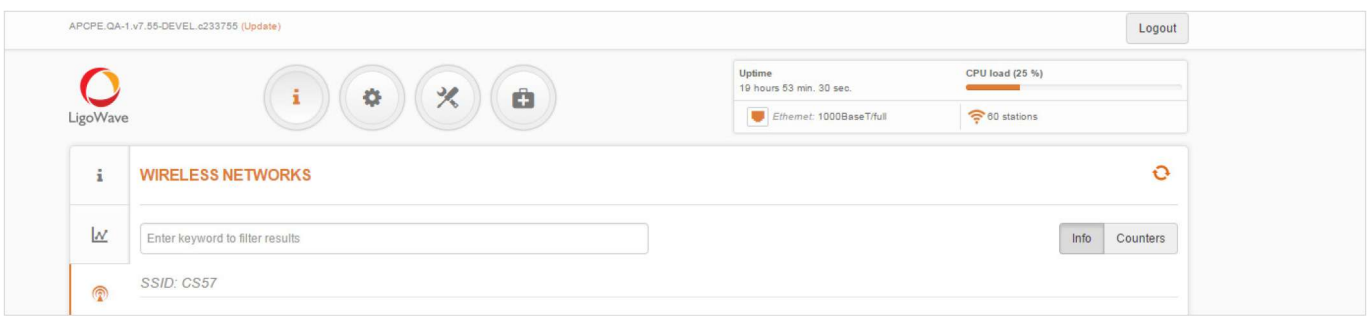
Newly released LigoDLB ac devices are a great opportunity for any WISP to upgrade their network with latest technologies based products increasing the capacity on their current network and expanding their services portfolio by adding additional revenue sources like VoIP services. LigoDLB ac products distinguish not only with the outstanding performance but is a great choice for an area, which is congested and with low noise-free spectrum availability. The selected base station (LigoDLB PRO 5 -90 – 17 ac) has a metal enclosure that works as a deflector eliminating interference and rejecting noise when different wireless equipment is co-located on a single tower.

The network was set up with 60 client devices connected to LigoDLB PRO 5 – 90 – 17 ac base-station. The base station comes with an integrated 17 dBi dual-polarized 90° sector antenna. The CPEs used for this network were LigoDLB 5 – 15 ac and LigoDLB 5 – 20 ac. All devices were operating in iPoll 3 mode. Initially, new equipment was deployed only for testing purposes, howerer now it has transformed to the network providing commercial services.

The real TCP throughput was between 60 Mbps and 70 Mbps with all 60 CPEs connected. Linkfor offers the 4 Mbps plan for their customers.

Stats

Mode	Access point (iPoll 3)
Channel width	20 MHz
Number of connected CPEs	60 (LigoDLB 5-15 ac and LigoDLB 5-20 ac)
CPE distances	0.3 - 3 km
Customer service	Internet access

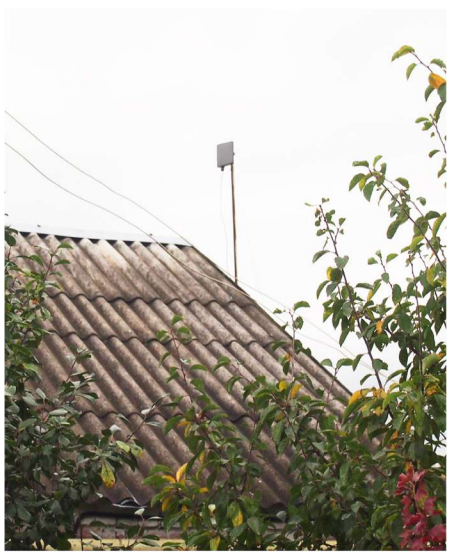


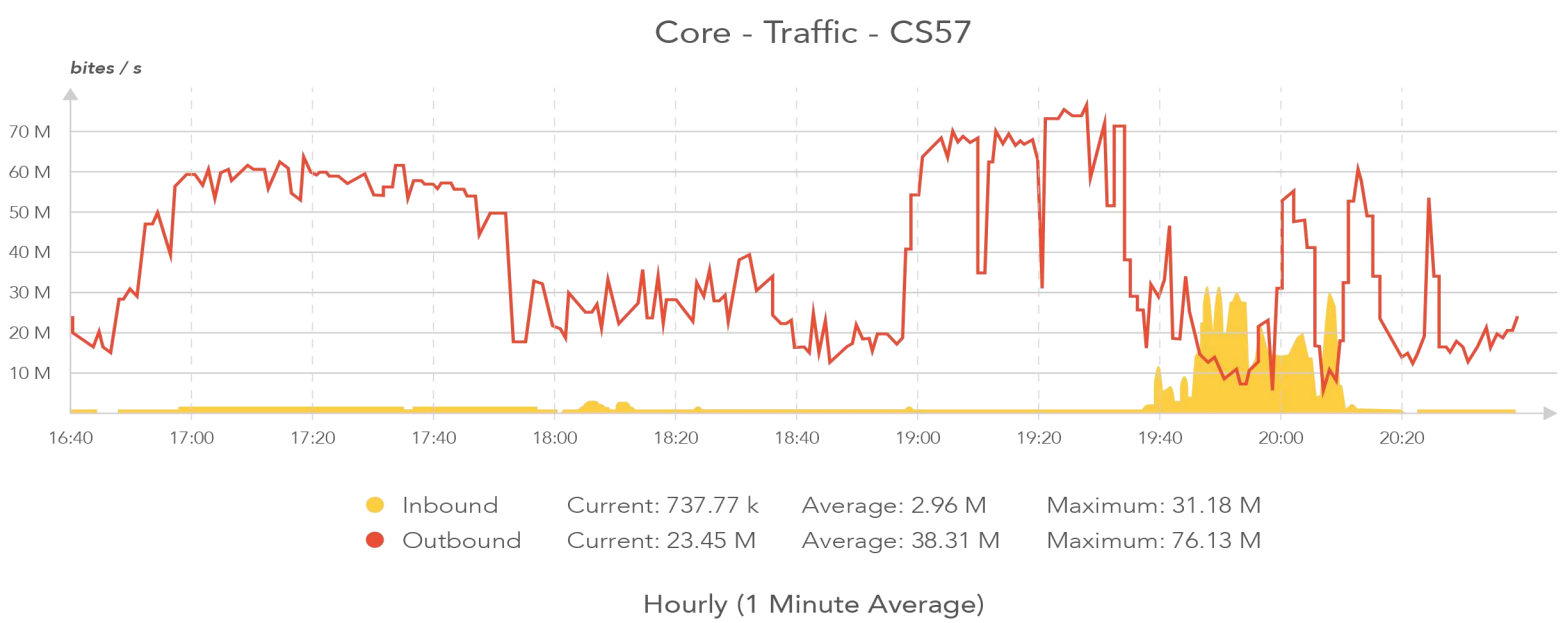
60 clients connected to the AP

IP address	Signal, dBm	Tx/Rx rate, Mbps	Tx/Rx CCQ, %	Protocol	Link uptime
10.123.35.11	-57 / -53	173 / 157	100 / 91	iPoll 3	14 hours 53 min. 32 sec.
10.123.35.12	-51 / -50	144 / 169	83 / 98	iPoll 3	14 hours 52 min. 49 sec.
10.123.35.13	-61 / -60	144 / 124	83 / 72	iPoll 3	14 hours 53 min. 28 sec.
10.123.35.14	-52 / -51	144 / 171	83 / 99	iPoll 3	14 hours 53 min. 32 sec.
10.123.35.15	-46 / -43	104 / 173	60 / 100	iPoll 3	49 min. 6 sec.
10.123.35.16	-52 / -59	104 / 142	60 / 82	iPoll 3	6 hours 38 min. 53 sec.
10.123.35.17	-57 / -53	104 / 116	60 / 67	iPoll 3	8 hours 57 min. 28 sec.
10.123.35.18	-53 / -53	144 / 171	83 / 99	iPoll 3	14 hours 53 min. 32 sec.
10.123.35.19	-53 / -58	104 / 173	60 / 100	iPoll 3	1 hour 47 min. 27 sec.
10.123.35.2	-46 / -48	104 / 173	60 / 100	iPoll 3	2 hours 9 min. 55 sec.
10.123.35.20	-52 / -50	173 / 171	100 / 99	iPoll 3	14 hours 53 min. 31 sec.
10.123.35.21	-51 / -48	144 / 172	83 / 99	iPoll 3	14 hours 53 min. 23 sec.
10.123.35.22	-62 / -61	144 / 113	83 / 65	iPoll 3	14 hours 53 min. 29 sec.
10.123.35.23	-63 / -63	104 / 88	60 / 51	iPoll 3	14 hours 21 min. 6 sec.
10.123.35.24	-69 / -66	104 / 17	60 / 10	iPoll 3	11 hours 56 min. 58 sec.
10.123.35.25	-50 / -50	173 / 169	100 / 98	iPoll 3	14 hours 53 min. 29 sec.
10.123.35.28	-60 / -59	144 / 132	83 / 76	iPoll 3	14 hours 53 min. 28 sec.
10.123.35.29	-61 / -58	78 / 124	45 / 72	iPoll 3	14 hours 53 min. 28 sec.
10.123.35.3	-53 / -49	173 / 167	100 / 97	iPoll 3	14 hours 53 min. 32 sec.
10.123.35.31	-60 / -61	144 / 131	83 / 76	iPoll 3	14 hours 53 min. 17 sec.
10.123.35.32	-51 / -52	173 / 162	100 / 94	iPoll 3	14 hours 53 min. 24 sec.
10.123.35.33	-62 / -69	129 / 99	75 / 57	iPoll 3	12 hours 2 min. 58 sec.
10.123.35.35	-57 / -54	173 / 143	100 / 83	iPoll 3	19 hours 52 min. 23 sec.
10.123.35.36	-53 / -53	173 / 151	100 / 87	iPoll 3	14 hours 51 min. 18 sec.
10.123.35.38	-51 / -49	104 / 169	60 / 98	iPoll 3	1 hour 19 min. 9 sec.
10.123.35.39	-53 / -53	173 / 144	100 / 83	iPoll 3	14 hours 53 min. 5 sec.
10.123.35.42	-50 / -52	173 / 173	100 / 100	iPoll 3	19 hours 52 min. 23 sec.
10.123.35.43	-54 / -53	173 / 153	100 / 88	iPoll 3	14 hours 52 min. 48 sec.
10.123.35.44	-67 / -68	129 / 68	75 / 39	iPoll 3	14 hours 53 min. 20 sec.
10.123.35.45	-60 / -58	173 / 153	100 / 88	iPoll 3	19 hours 52 min. 23 sec.
10.123.35.47	-53 / -50	104 / 117	60 / 68	iPoll 3	41 min. 37 sec.
10.123.35.48	-58 / -55	104 / 146	60 / 84	iPoll 3	3 min. 19 sec.
10.123.35.49	-56 / -52	104 / 160	60 / 92	iPoll 3	30 min. 50 sec.
10.123.35.5	-49 / -50	116 / 173	67 / 100	iPoll 3	14 hours 30 min. 34 sec.
10.123.35.50	-58 / -65	104 / 81	60 / 47	iPoll 3	12 hours 41 min. 46 sec.

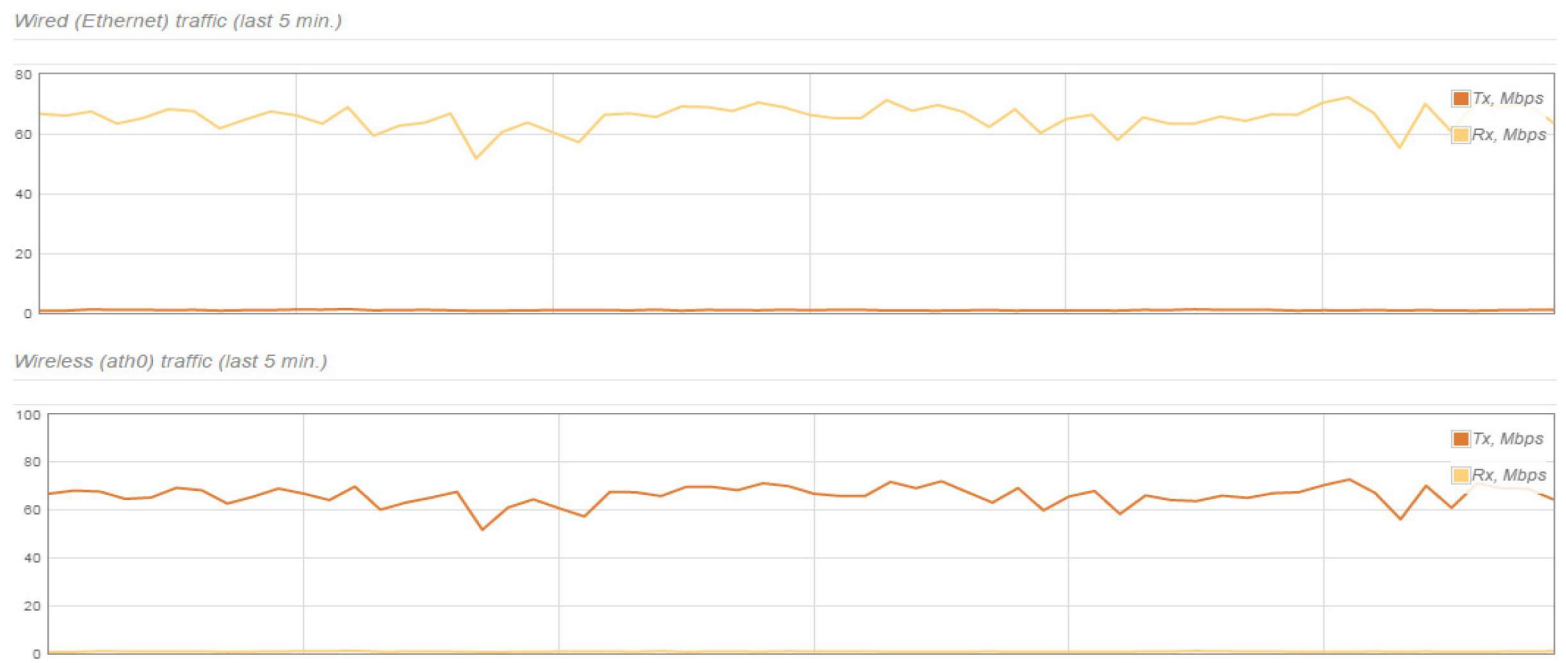
IP address	Signal, dBm	Tx/Rx rate, Mbps	Tx/Rx CCQ, %	Protocol	Link uptime
10.123.35.52	-56 / -54	104 / 129	60 / 75	iPoll 3	2 hours 5 min. 19 sec.
10.123.35.53	-47 / -47	104 / 173	60 / 100	iPoll 3	4 hours 18 min. 16 sec.
10.123.35.54	-61 / -57	173 / 128	100 / 74	iPoll 3	14 hours 53 min. 24 sec.
10.123.35.56	-57 / -55	104 / 161	60 / 93	iPoll 3	11 hours 14 min. 53 sec.
10.123.35.57	-49 / -46	173 / 172	100 / 99	iPoll 3	14 hours 53 min. 28 sec.
10.123.35.58	-65 / -64	129 / 117	75 / 68	iPoll 3	14 hours 53 min. 21 sec.
10.123.35.6	-54 / -52	129 / 164	75 / 95	iPoll 3	14 hours 53 min. 32 sec.
10.123.35.60	-65 / -52	104 / 102	60 / 59	iPoll 3	52 min. 34 sec.
10.123.35.61	-56 / -54	173 / 157	100 / 91	iPoll 3	14 hours 53 min. 28 sec.
10.123.35.63	-54 / -51	104 / 171	60 / 99	iPoll 3	5 hours 12 min. 51 sec.
10.123.35.65	-52 / -49	173 / 173	100 / 100	iPoll 3	14 hours 53 min. 28 sec.
10.123.35.66	-57 / -58	144 / 131	83 / 76	iPoll 3	14 hours 53 min. 28 sec.
10.123.35.67	-46 / -49	173 / 173	100 / 100	iPoll 3	19 hours 52 min. 23 sec.
10.123.35.68	-57 / -55	104 / 150	60 / 87	iPoll 3	14 hours 53 min. 27 sec.
10.123.35.69	-56 / -56	173 / 150	100 / 87	iPoll 3	14 hours 53 min. 29 sec.
10.123.35.71	-67 / -67	104 / 103	60 / 60	iPoll 3	14 hours 5 min. 59 sec.
10.123.35.72	-51 / -58	173 / 148	100 / 86	iPoll 3	11 hours 56 min. 42 sec.
10.123.35.73	-54 / -51	104 / 124	60 / 72	iPoll 3	1 hour 15 min. 36 sec.
10.123.35.76	-56 / -56	104 / 108	60 / 62	iPoll 3	4 hours 33 min. 25 sec.

Statistical information from each client device

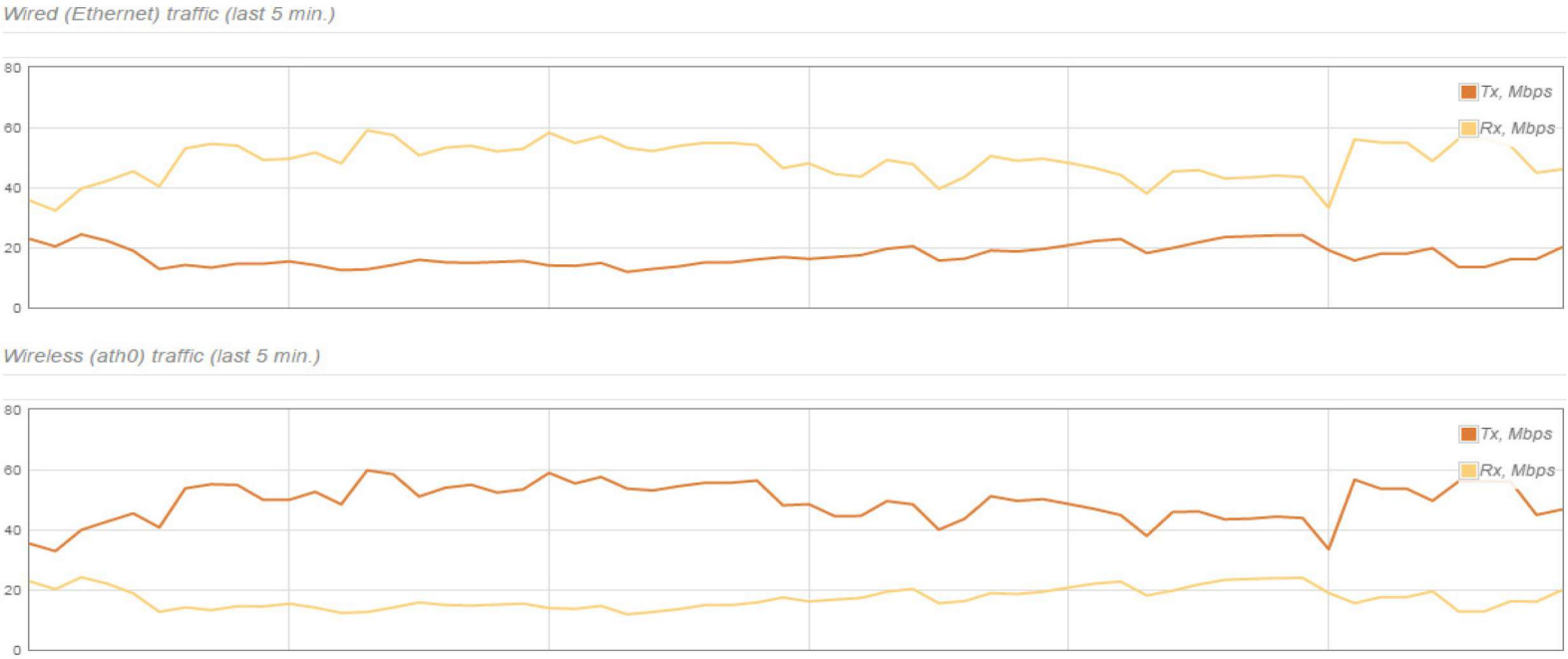




The graph above shows throughput of real wireless network containing 60 client devices. The graph was taken during the evening period when network activity is at its peak. The average throughput in the evening is around 38 Mbps and maximum throughput reaches up to 76 Mbps. It is important to mention that devices are operating on a 20 MHz channel width.



Throughput information on the base-station user interface. Single direction traffic is generated from AP to CPEs.



Throughput information on the base-station user interface. Bidirectional traffic is generated from AP to CPEs.

The performance test has show that new generation last-mile wireless equipment provides about 30% higher performance comparing to it predecessor and it is an ideal upgrade solution for 11N technology based networks. The max capacity of base-station can go up to 500 Mbps, which allows delivering fast and reliable internet connectivity at a very competitive price. The graph below illustrates performance comparison information.