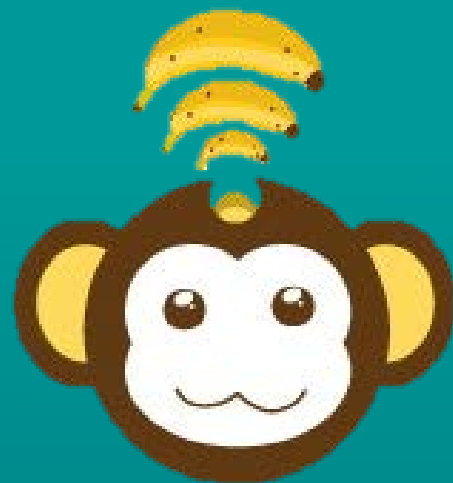






X

Kencana.Net
Fiber Optic and Wireless Networking Services

MikroTik

**WISP
FOR
ENGINEERS**

‘WISP with MikroTik’

ISP WIRELESS DIBANTU DENGAN
PERANGKAT MIKROTIK TIDAK “IMPOSSIBLE”



WENAS ONGKOWINOTO

CO-OWNER PRIMABANANEN

“Usaha ISP bukan seperti RTRWNet”

PERKENALAN

- Dari:
 - PRIMABANANEN PTE. LTD. (Singapore – Co-Owner)
 - KencanaNET (Indonesia – Co-Owner)
- Pengalaman:
 - Pemasangan dan Design Jaringan Nirkabel seluas Kota
 - Perancangan Jaringan Nirkabel ber-Lisensi dan tanpa lisensi
 - Management xISP
 - Wireless Roaming menggunakan SSO (Single Sign On)
 - Dst.



Outline Presentasi

- Dimana?
 - wISP
 - Pemain
- Bagaimana?
 - Kesulitan
 - Topology
 - Devices Sizing
 - Operational
 - D-D
 - QoS
- SLA
 - Management
- Kenapa?
 - Daya Beli
 - Target
- SWOT - Conclusion

wISP

Apa itu wISP?

wISP itu adalah singkatan dari
Wireless ISP

Alias Penyedia Jaringan Internet
melalui Nirkabel.

- **INDONESIA**



Pemain xISP sekarang?

- Fixed/Wired/Wireless:
 - 100+ ISP
 - Incumbent = NAP
- Mobile Broadband:
 - 5 (all major operator)
 - 4G coverage ? – estimated less than 30% , major roads and urban area only.

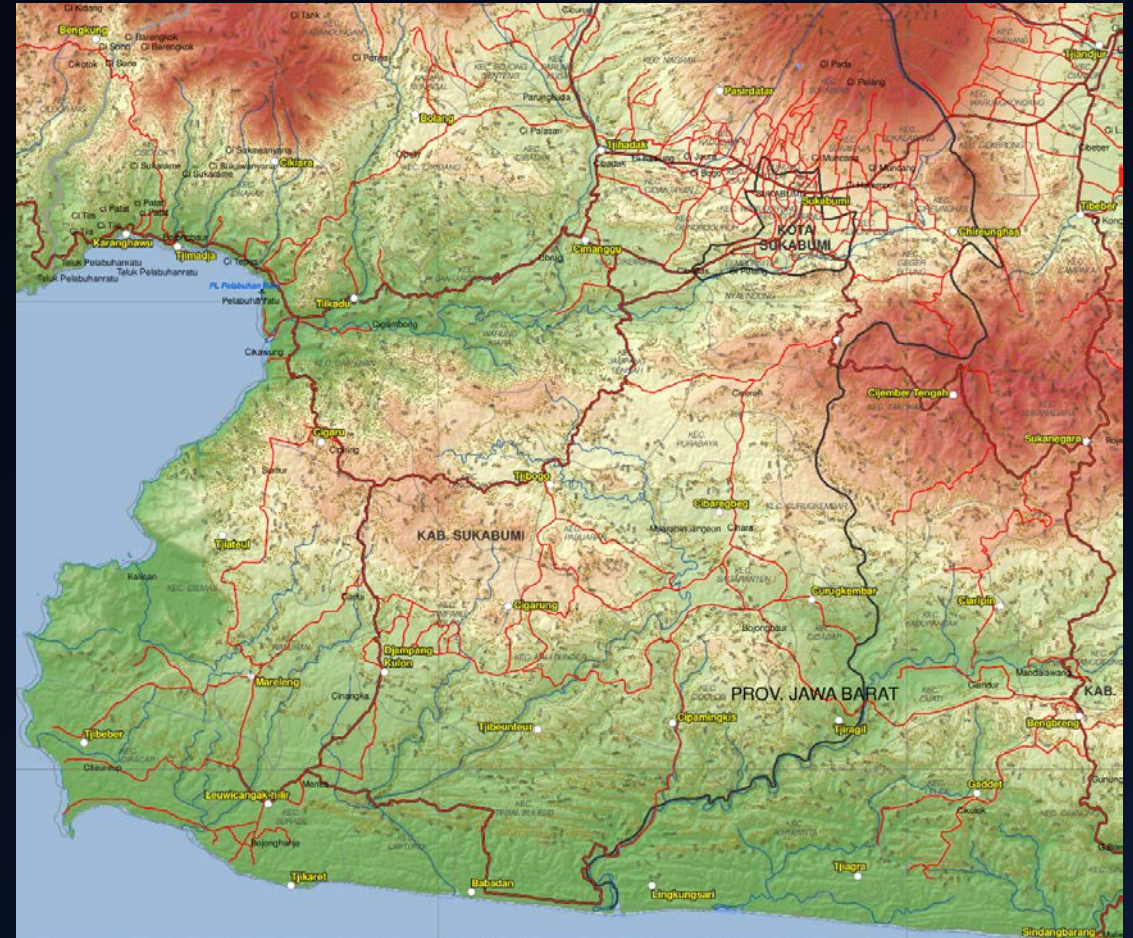
Kesulitan dari wISP kecil

- 
- Limitasi Geografi
- Harga Bandwidth
- Populasi non padat. Tetapi memerlukan (US FCC's defined Broadband) speed. [25Mbps DL / 3Mbps UL]
- Listrik

Limitasi Geografis

Contoh: Sukabumi

- Banyak tebing.
- Harus mengitari pegunungan dan lembah.

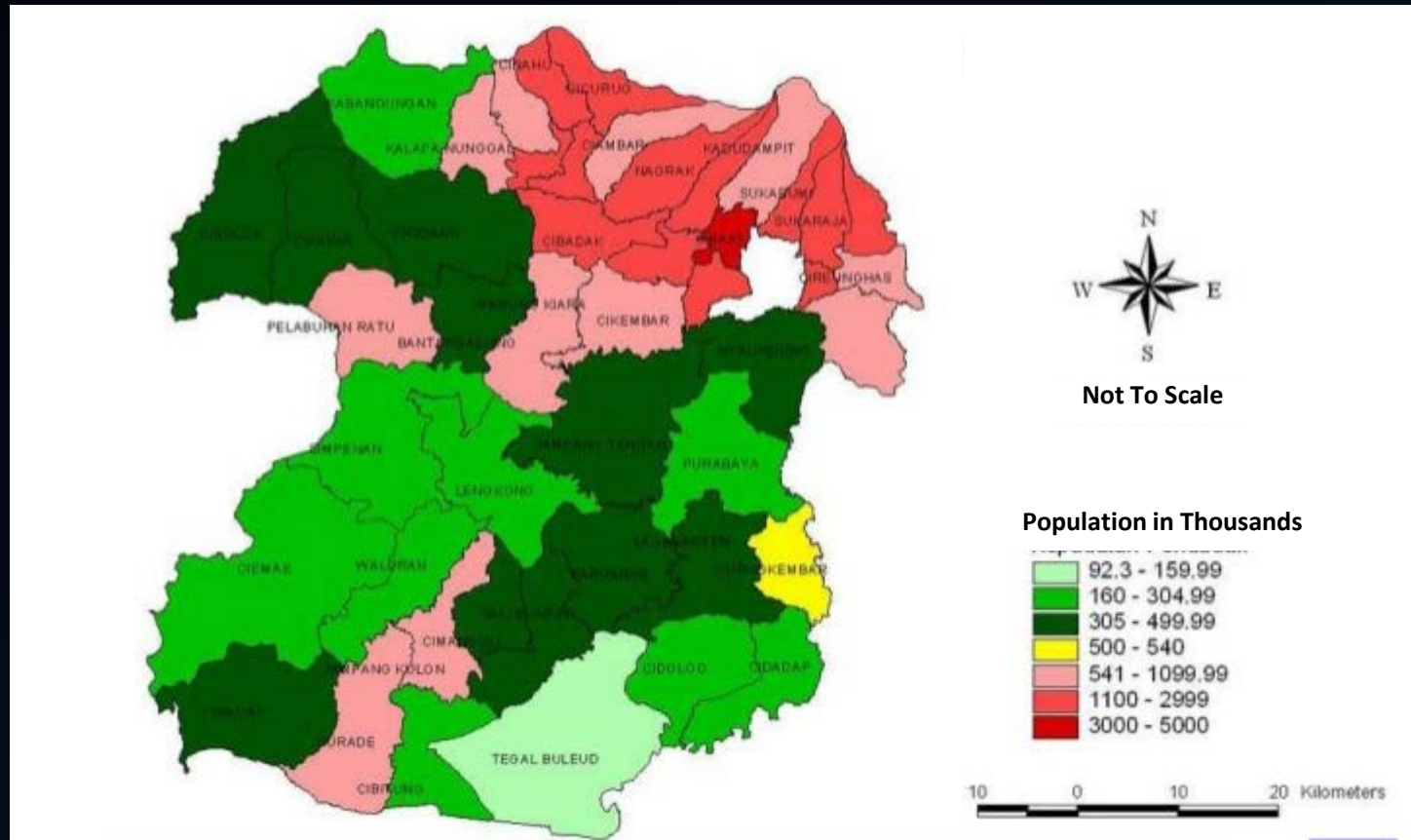


Harga Bandwidth

- Bujug buset. Shocking. Absurd.
- 100Mbps for ~50jt diantar (belum nego) [Luar Pulau Jawa]

Bandwidth (Mbps)	JaBoDeTaBek	Jawa
1	1,300,000	1,460,000
2	2,530,000	2,840,000
3	3,690,000	4,140,000
4	4,770,000	5,350,000
5	5,780,000	6,480,000
6	6,720,000	7,530,000
7	7,590,000	8,510,000
8	8,380,000	9,390,000
9	9,100,000	10,200,000
10	9,750,000	10,920,000
20	18,960,000	21,240,000
50	43,340,000	48,550,000
100	73,130,000	81,910,000
200	142,200,000	159,270,000
500	325,030,000	364,040,000
1000	506,800,000	567,600,000

Kepadatan Penduduk



Listrik

- SLA – nihil
- Coverage – hanya dekat jalan umum. Tidak ada di daerah pegunungan dan perkebunan.
- Solusi?

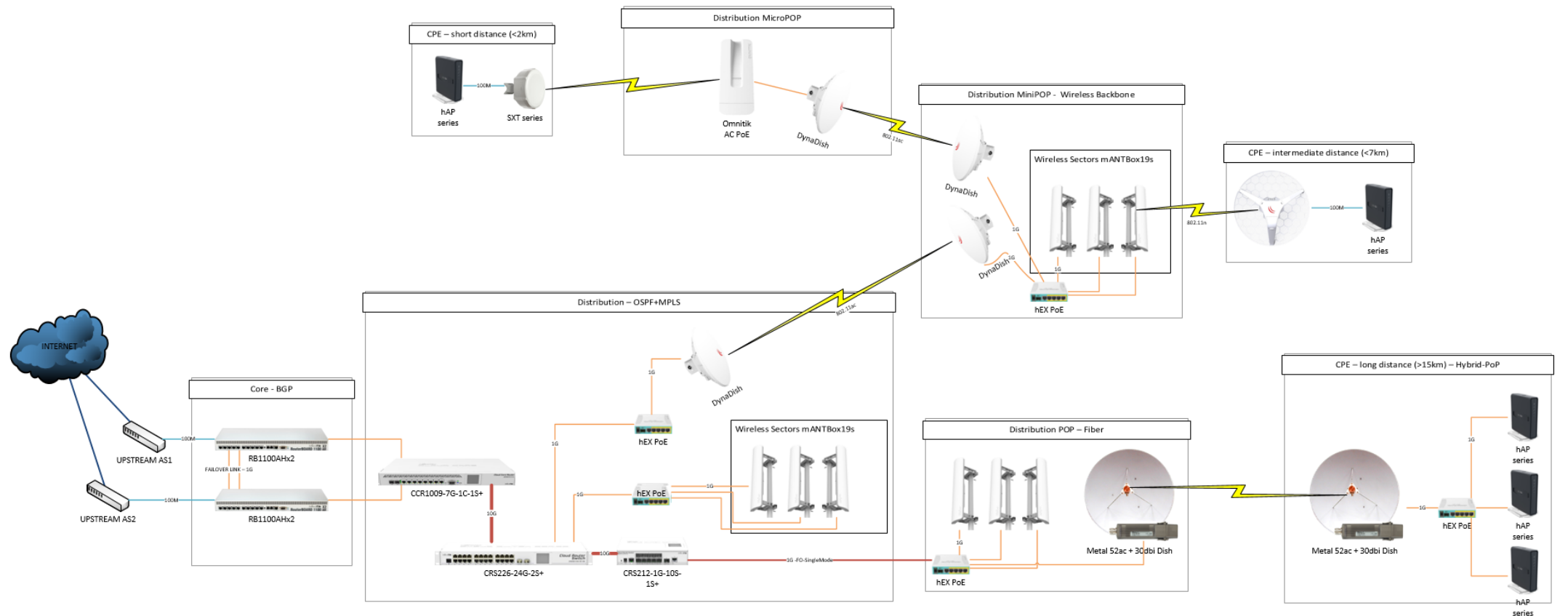
- **ADA**

Listrik

- Pakai Solar Panel and DC-DC inverter.



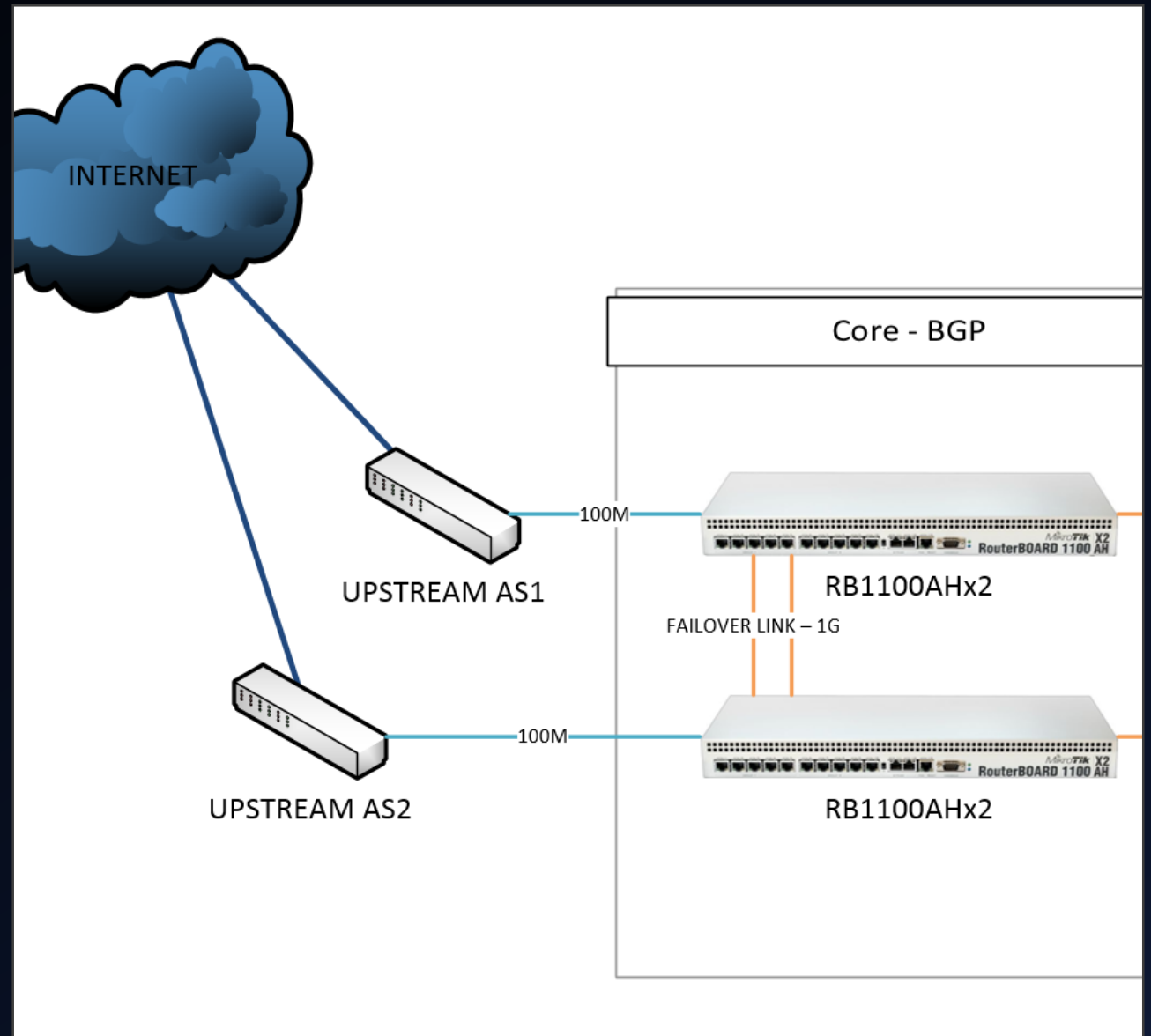
Topology – Hybrid WAN



MikroTik Solution
Provided By:
Primabananan
Pte. Ltd.

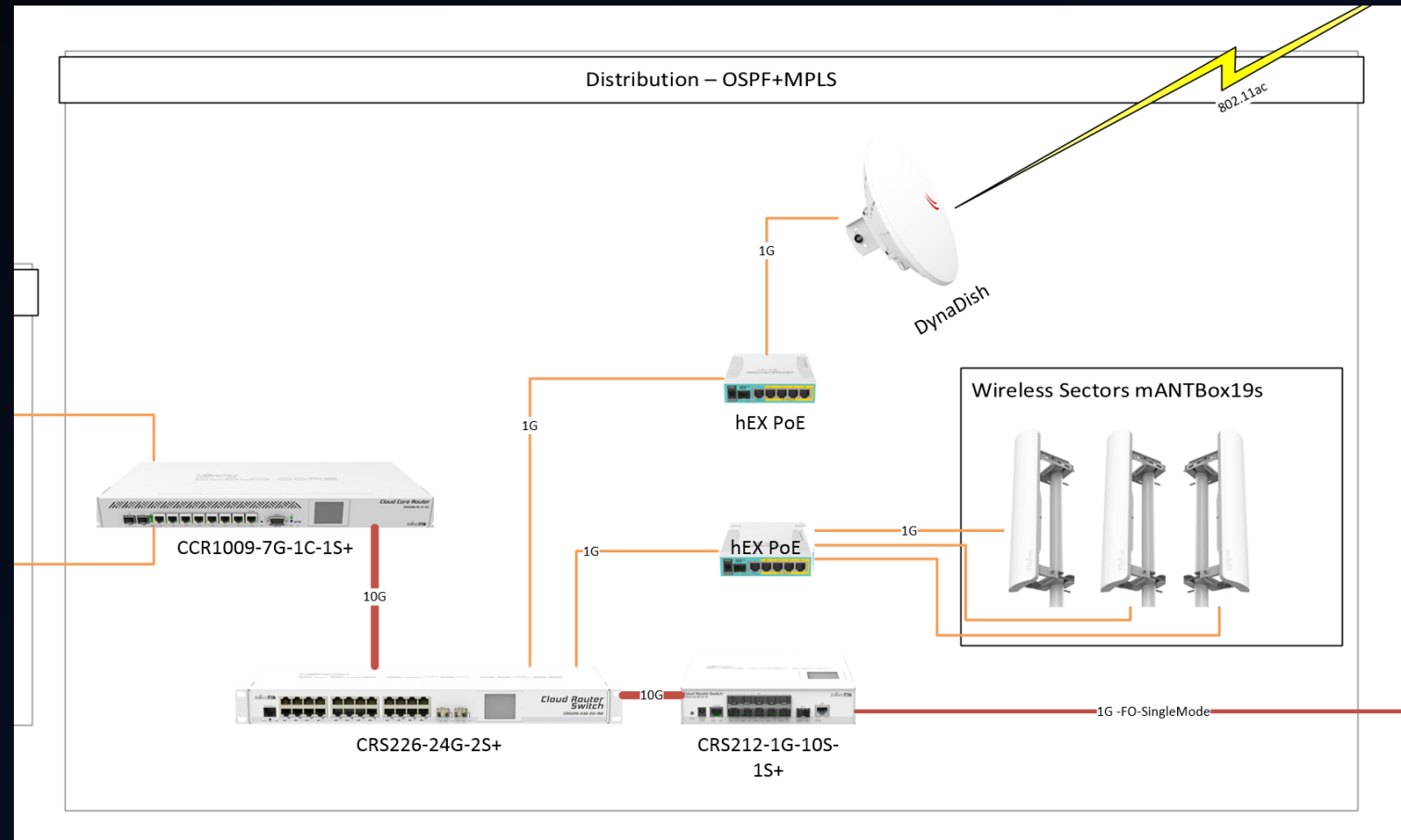
TCORE

- 2 Upstreams – Multihoming
- Failover - OSPF
- Core -> Redundancy
- RB1100AHx2 – 2x BGP Full Feed



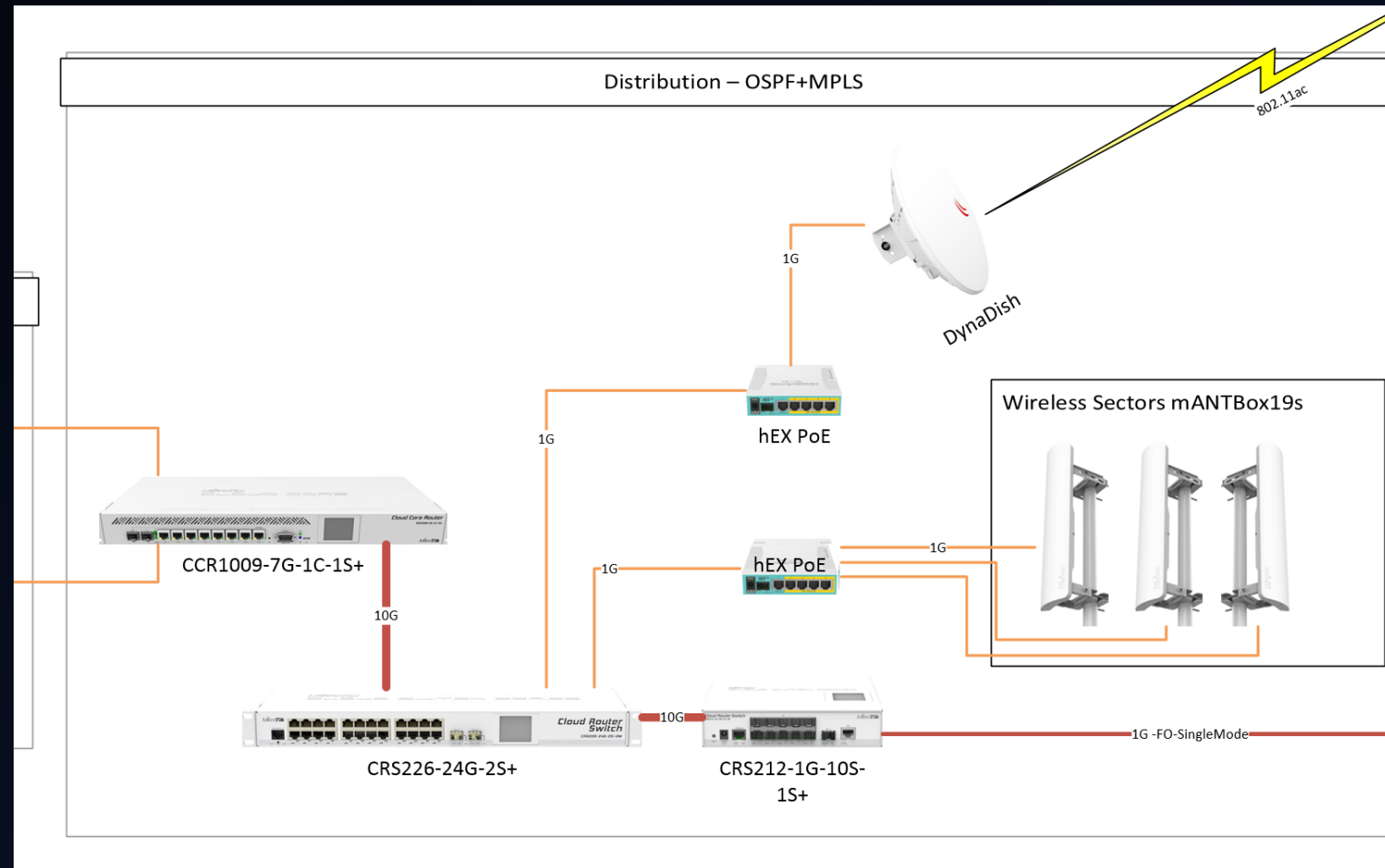
DISTRIBUTION

- Core Distribution Router
 - MPLS
 - OSPF
- Firewall and PPPoE+RADIUS
 - Dipisah
- 10G Switch = CCR's Port Multiplier
- Common MPLS PE = RB960PGS
- Fiber-uplinked PoP lewat CRS212 (affordable SFP switch)



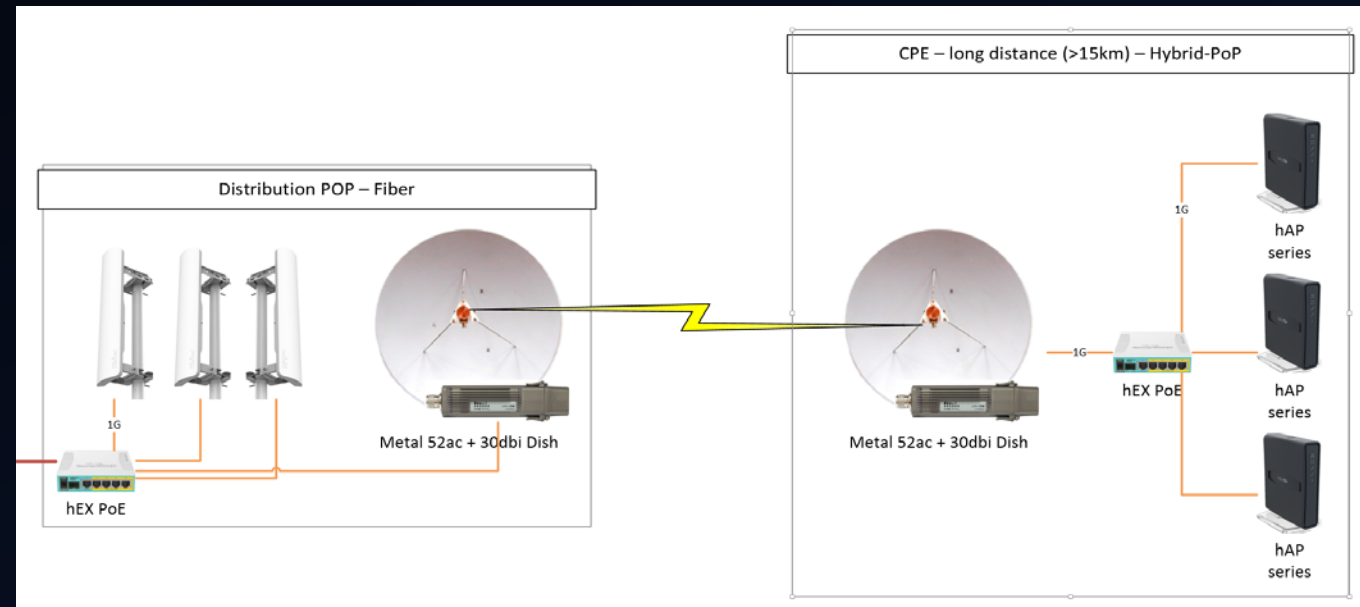
DISTRIBUTION (CONT'D)

- Menggunakan hEX PoE sebagai PoE Injector untuk mANTBox
- 3x mANTBox = 360° coverage sekitar PoP
- Untuk PtP Links, pakai Dynadish or QRT5ac, for < 10km



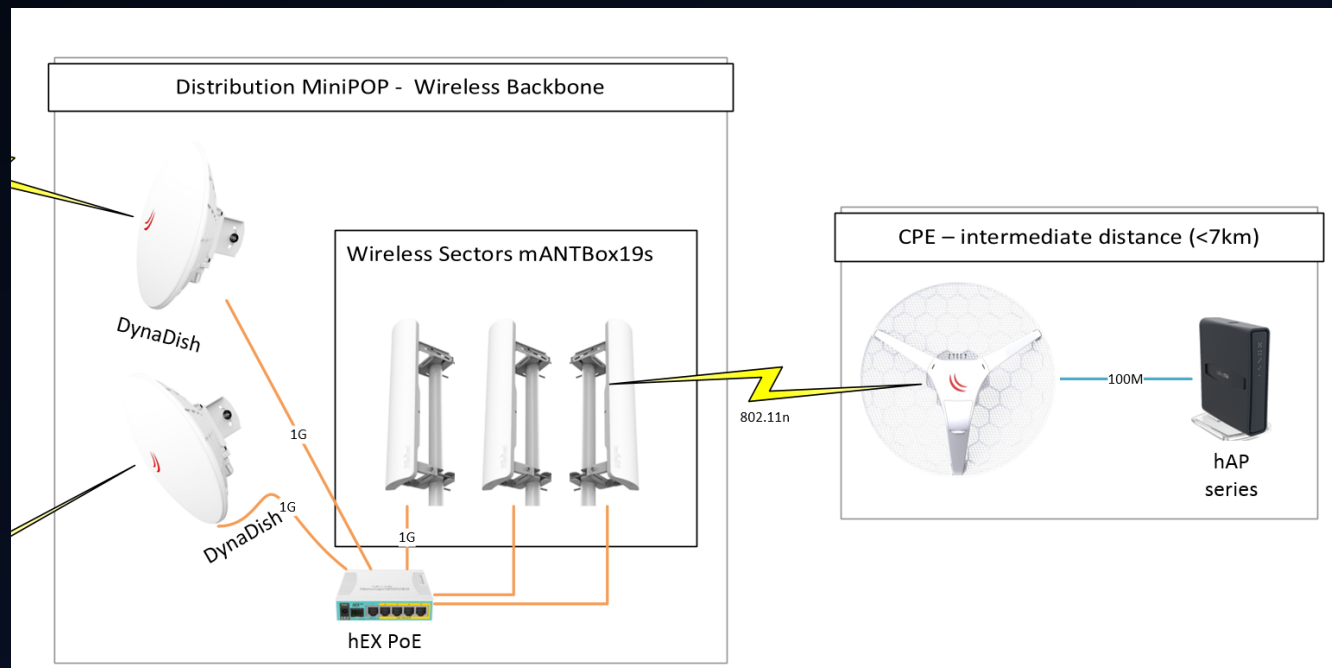
POP AND CPE - FIBER

- Fiber Uplinked PoP memberikan kapasitas bandwidth besar.
- Long Distance PtP repeater.
- Metal 52ac with 30dB Solid = 25km.
 - Masih melewati 30-40Mbps TCP duplex dengan sedikit latency spike.



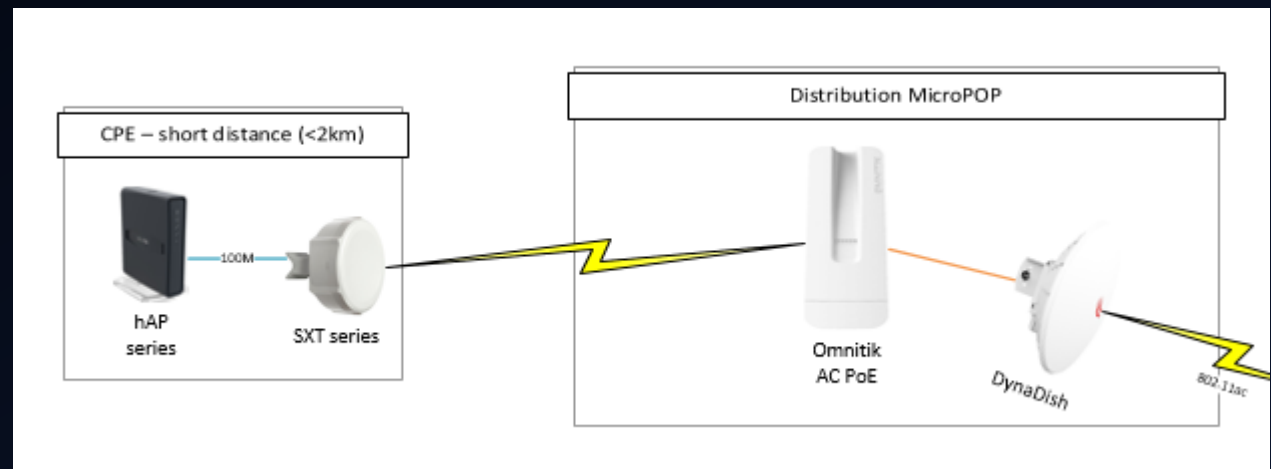
POP AND CPE – WIRELESS UPLINKED

- Wireless Uplinked PoP memberikan kapasitas skalable dengan biaya awal terjangkau.
- Limitasi Geografis, MiniPOP akan membantu menghilangkan dead/blank spots.
- MiniPOP = 7-10km coverage
- Harga dari MiniPOP? <1500USD
- CPE = LHG5



POP AND CPE – WIRELESS UPLINKED

- MicroPOP konsep baru dalam penyaluran fixed broadband melalui wireless.
- Cocok untuk pemukiman padat.
- Lebih murah dari MiniPOP.
- CPE <120USD
 - Balik modal dengan 10USD per bulan dalam 1 tahun.



Penggunaan Mikrotik

- Core:

- RB1100AHx2

- Legendary Uptime
 - Bypass Ports
 - No Fuss Architecture



- Distribution [Wired]:

- CCR1009-7G-1C-1S+

- 9 cores at 1.2Ghz
 - Great as PPPoE BRAS
 - MPLS ready
 - Wonderful Simple Queue performance
 - 10G!



- CRS226-24G-2S+-RM

- Switch at line rate.
 - 2x 10G for daisy chain.
 - More and more documentation available.
 - Cheaper than major brands.

- CRS212-1G-10S-1S+

- CRS226's Fabric Extender
 - Great for OE/AE CPE and Backbone



- hEX PoE / Powerbox Pro

- Affordable Gigabit PoE Injector
 - MPLS ready CE/PE
 - SFP for Fiber



Mikrotik Devices Used

- Distribution [Wireless]:

- Dynadish 5

- Unlicensed Spectrum Ready
 - 25db Gain, on a compact dish footprint
 - High throughput, 802.11ac ready.



- mANTBox-s

- 15/19dBi 120° sectoral antenna
 - 3 for 1 great 360° coverage
 - Big RAM = more devices can connect
 - SFP for Fiber uplink, GPON ONU.



- Metal 52ac

- Rx Sensitivity – Best in Class (SISO)
 - Rugged built quality.
 - Common N-Type Connector for wide range of antenna selection.
 - Gigabit.

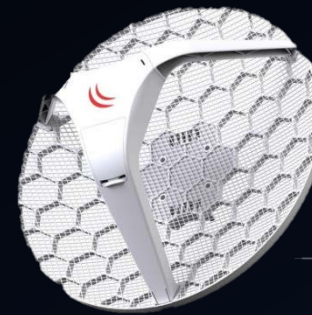


Mikrotik Devices Used



- MicroPOP [Wireless]:
 - Omnitik AC PoE
 - Uplinking two or more Backbone PtP Wireless Radio
 - PoE out, use Midspan for best result.

- CPE [Wireless]:
 - SXT – affordable <2km
 - DiscLite – SXT killer but no 802,11ac yet. <5km

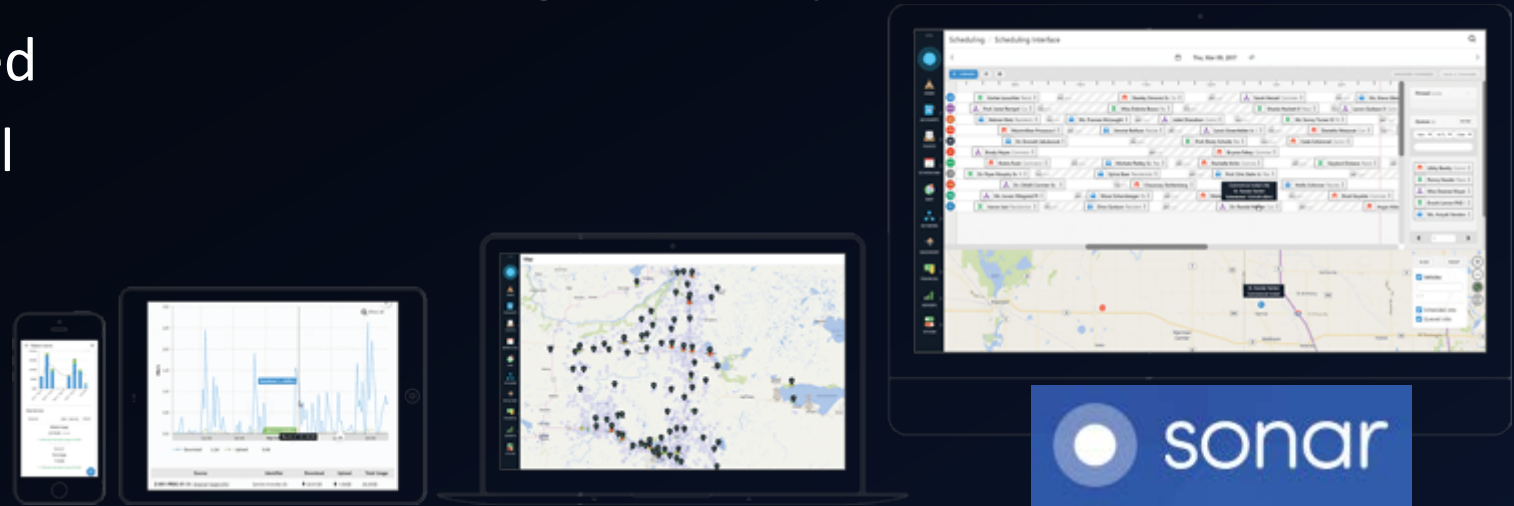


- LHG5 – lightweight. <7km
- QRT5ac – more expensive but gold radio performance <10km
- LDF5 + KuBand Offset dish 90cmø – 30km OK!
- Dish, Grid, Panel + Metal 52ac = <15km
- CPE [Wired]:
 - hAP ac lite
 - Dual Band

OPERASIONAL

D-D Operation

- Kita dapat menggunakan ISP management system
 - Cloud vs Dedicated
 - Hosted vs Physical



- Simple. Gak ribet.
- Billing, CRM, Monitoring and Provisioning semua dalam satu pintu.

QoS

- Cukup menggunakan “queue-ing” milik Mikrotik, kita dengan mudah menyalurkan Internet dengan “quality of service”.
- Ditambah dengan DSCP, 802.11q Priority.
- PCQ – HTB – SFQ – DII.

Queue List			
Simple Queues			
Interface Queues			
Queue Tree			
Queue Types			
Interface	Queue Type	Active Queue Type	
ether1	only-hardware-queue	only-hardware-queue	
ether2	only-hardware-queue	only-hardware-queue	
ether3	only-hardware-queue	only-hardware-queue	
ether4	only-hardware-queue	only-hardware-queue	
ether5	only-hardware-queue	only-hardware-queue	
wlan1	wireless-default	wireless-default	
ppp-out1	no-queue	no-queue	

SLA

- Apakah device-device Mikrotik dapat memberikan dan menyalurkan servis Internet dengan SLA?

• **BISA**

Ide Sharing

- Sharing Economy?
 - Provision “Virtual” SSID
 - HOTSPOT FREE/PAID
 - SNS LOGIN
 - [giveme.online]
 - ADVERTISEMENT AS A SERVICE
 - WiFi Roaming
 - e.g (eduroam, iPass, etc.)



Ide Sharing

- Sharing Economy?
 - VNO “VIRTUAL NETWORK OPERATOR”
 - Other ISP = join Infrastructure = save cost

Wireless Tables		
Interfaces		
Nstreme Dual		
Access List		
Registration		
CAP		
WPS		
Name		
Type		
::: MGMT SSID		
S	wlan1	Wireless (Atheros AR9300)
::: HOTSPOT - VLAN 1911		
RS	wlan2	Virtual
::: CPE ACCESS - VLAN 1101		
S	wlan3	Virtual
::: CAPTIVE PORTAL - VLAN 667		
S	wlan4	Virtual
::: VNO - SKBMHS - VLAN 810		
S	wlan5	Virtual

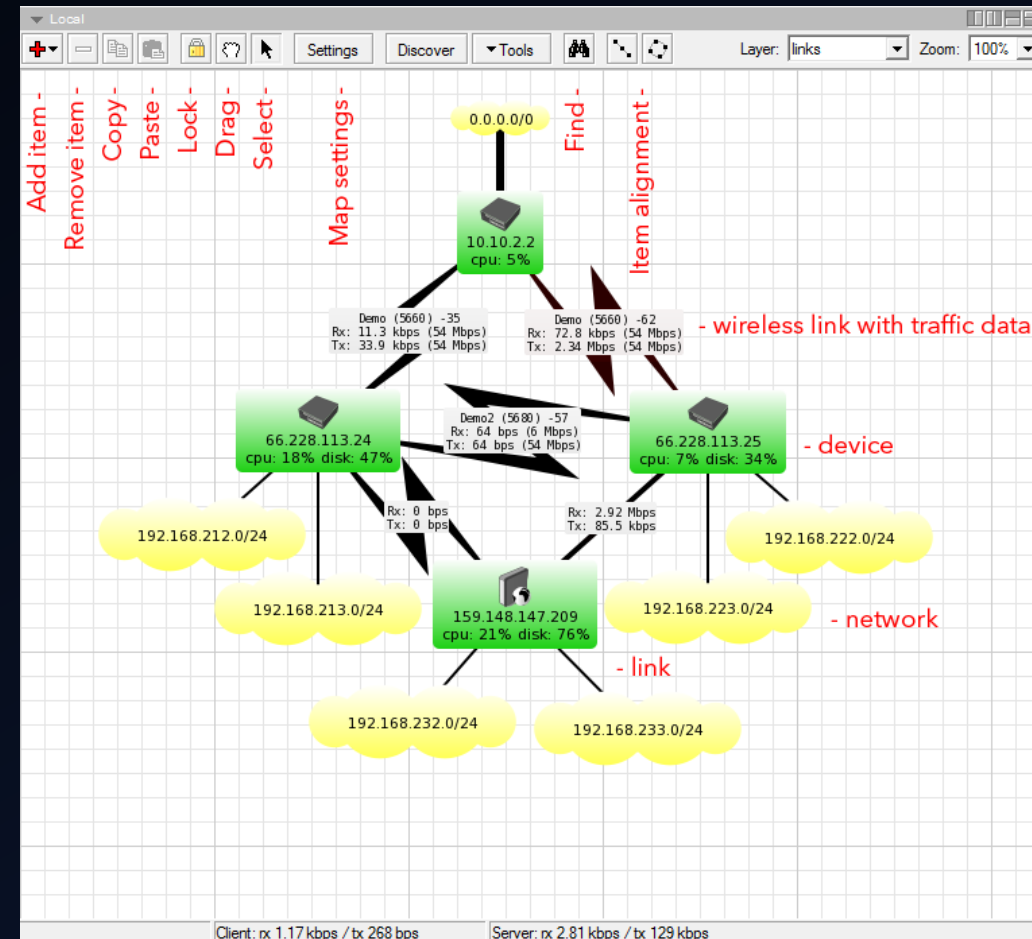
Staff Management

- Di awal, cukup dengan:
 - 2 shifts of 2 people on NOC
 - 1 Billing
 - 1 Marketing

Small Team = Coordinated Work

The DUDE Monitoring

Visit:
wiki.mikrotik.com



Tapi....

Target User

- Kantor Pemerintahan
 - Kepolisian
 - Branweer
- Rumah Sakit, Klinik
- Kantor Kelurahan / Kecamatan
- NGO/NPO
- Daerah yang belum terjangkau oleh mode Telekomunikasi yang “terjangkau”.

Daya Beli

- Dari survey setempat (Bandung):
 - Paket Internet yang paling banyak digunakan = 300rb Rupiah
 - Termasuk:
 - Internet @ 10Mbps DL / 2Mbps UL
 - IPTV @ FTA channels
- Apa yang kita berikan dengan harga yang sama?
 - Internet @ 25Mbps DL / 5Mbps UL
 - Tapi CPE dibayarin customer.
 - Tidak paling murah, tapi servis memuaskan.

SWOT di Infrastruktur menggunakan *MikroTik*



SWOT di Infrastruktur menggunakan *MikroTik*

- Strength (Kekuatan)
 - Harga Terjangkau
 - Performa Masuk Akal
 - Komunitas

Strength

- Low Cost
- Reasonable Performance
- Strong Community

SWOT di Infrastruktur menggunakan *MikroTik*

- Weakness (Kelemahan)
 - Tidak Mudah Untuk Belajar Dari Dasar
 - Belum NGNBN Ready
 - Sangat Rentan Dengan Maintenance Rutin

Weakness

- Steep Learning Curve
- Not Yet NGNBN
- Not Maintenance-Free

SWOT di Infrastruktur menggunakan *MikroTik*

- Opportunities (Kesempatan)
 - Sistem Ekonomi Gotong Royong
 - Masih Banyak Daerah Yang Bisa Diserbu
 - Terobosan Pasar Kepada Socio-economy Menengah.

Opportunities

- Sharing Economy system
- Plenty of area to be penetrated
- Market breakthrough

SWOT di Infrastruktur menggunakan *MikroTik*

- Threats (Ancaman)
 - Pemain Tidak Asing
 - Kecepatan vs Fiber GPON
 - Skala Ekonomi

Threats

- The Incumbents
- Speed vs Fiber GPON
- Economic of Scale

THANK YOU

WHERE TO FIND ME ?



wenas.ongkowinoto