

Mikrotik at Roskilde Festival

Building a redundant city-sized network in less than two weeks

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What is Roskilde Festival?

- Largest music festival in Northern Europe
- 130.000+ guests over 8 days
- The festival area covers 2.500.000 m² (about 350 soccer fields)
- More than 30.000 volunteers

..and more than 1 million liters of beers consumed!





Holbækmotorvejen

12

23

Darupvej

Roskilde Dyrskue

Darupvej

Roskilde Dyrskue

Roskilde Tekniske Skole

Darupvej

Roskilde Festival

Roskilde Fiskeland

Vor Frue Hovedgade

Køgevej

Vor Frue

Kamstrupvej

Nunc A/S Plastfabrikation

Kamstrup

Vor Frue Fritidscenter

IT volunteers

- A total of about 170 volunteers in the group
- Split into sub divisions, i.e.:
 - IT support
 - Network
 - Planning and design
 - Config
 - Deployment (physical)
 - Cabling (core network)
 - Cabling (bars, food stalls, etc.)
 - Free guest WiFi

Network facts

- 35 kilometers of CAT5E installed in less than two weeks - *every year*
- 40 fiber POP's
- 1+ Gbps internet connectivity
- Most covered by redundant connectivity (fiber, CAT5E or wireless) using OSPF
- End-user connectivity separated into hundreds of individual VRFs
- Extremely dynamic backbone capable of offering “most network services” (for example: MPLS, public IP addresses, layer 2 between physical locations, etc.)
- Tens of thousands of users, for example the free public wifi, credit card terminals, press areas, ticket booths, etc.
- Wireless PTP and PTMP using **Mikrotik**

Mikrotik products being used for:

- Wireless links for the existing core network
 - Mainly for redundancy
 - ..but also for difficult-to-reach-by-multiple-cables areas
- “Easy to install (dumb)”-internet access for bars and similar, located far away from core network areas

Point-to-Point and Point-to-MultiPoint

- Three radio towers used with multipoint sector antennas:
 - East
 - West
 - “The police tower” (Orange scene, main stage - permanent)
- Many Point-To-Point links between core equipment, replacing (and supplementing) the more expensive fiber runs

Sector antennas in the area



Web-based overview of PTMP

Base plads-bsu-001

Client name Base Interface Signal Strength Uptime Registered Location Update Location

Base plads-bsu-002

Client name	Base Interface	Signal Strength	Uptime	Registered Location	Update Location
client-43	wlan3	-63	2d23h11m18s		Update
client-56	wlan3	-59	2d23h11m18s	Indre plads - Artist Village - Artist checkin {55.623067;12.0831}	Update
client-15	wlan4	-48	2d23h11m18s		Update
client-135	wlan2	-65	2d23h11m18s	Ydre Danisbo Container {55.61707;12.07583}	Update
client-16	wlan2	-49	2d23h10m59s	Indre plads - Trade zone syd øst {55.61933;12.07868}	Update
client-85	wlan4	-66	2d21h2m26s	Ydre Bycenter Oest Food {55.61366;12.08698}	Update
client-131	wlan2	-51	2d20h54m57s	Indre Apollo Oelbod {55.61753;12.07439}	Update
client-124	wlan3	-67	2d20h9m20s	Billetsalg East - Ydre - Entrance East {55.6182127;12.0914297}	Update
client-100	wlan2	-58	2d13h18m37s		Update
client-70	wlan4	-64	1d11h27m	Ydre plads :: Agora N {55.6160073;12.0891296}	Update
client-28	wlan2	-61	1d5h13m57s		Update
client-129	wlan4	-78	22h46m55s	Kenneths campingvogn? Vor Frue	Update
client-108	wlan2	-84	22h26m44s	Indre plads :: Handelsøen :: oelbod orange vest {55.621110;12.0	Update
client-49	wlan4	-55	22h7m45s	Ydre plads :: Agora L :: Madbod {55.617340;12.083900}	Update
client-133	wlan2	-46	15h42m36s	Indre plads :: Orange :: Tribune {55.620100;12.077120}	Update
client-41	wlan4	-54	6h57m2s	Ydre Agora L 3Reload {55.61720;12.08362}	Update
client-54	wlan2	-52	6h56m20s		Update

Base west-bsu-001

Client name	Base Interface	Signal Strength	Uptime	Registered Location	Update Location
client-137	wlan2	-27	3d1h29m23s		Update
client-140	wlan1	-47	2d22h28m55s	Ydre plads :: Bycenter West :: Check-in nord {55.622190;12.06923}	Update

Sector antennas configuration snippets



```
/interface wireless
```

```
set 0 band=5ghz-a/n channel-width=20/40mhz-ht-above country=denmark disabled=no frequency=5700 l2mtu=2290  
mode=ap-bridge mtu=1586 nv2-preshared-key=veryDog nv2-security=enabled radio-name=RF-west-sector-5 rate-  
selection=legacy ssid=RF-wifi wireless-protocol=nv2
```

```
set 1 band=5ghz-a/n channel-width=20/40mhz-ht-above country=denmark disabled=no frequency=5640 l2mtu=2290  
mode=ap-bridge mtu=1586 nv2-preshared-key=veryDog nv2-security=enabled radio-name=RF-west-sector-6 rate-  
selection=legacy ssid=RF-wifi wireless-protocol=nv2
```

```
set 2 band=5ghz-a/n channel-width=20/40mhz-ht-above country=denmark disabled=no frequency=5280 l2mtu=2290  
mode=ap-bridge mtu=1586 nv2-preshared-key=veryDog nv2-security=enabled radio-name=RF-west-sector-7 rate-  
selection=legacy ssid=RF-wifi wireless-protocol=nv2
```

```
set 3 band=5ghz-a/n channel-width=20/40mhz-ht-above country=denmark disabled=no frequency=5320 l2mtu=2290  
mode=ap-bridge mtu=1586 nv2-preshared-key=veryDog nv2-security=enabled radio-name=RF-west-sector-8 rate-  
selection=legacy ssid=RF-wifi wireless-protocol=nv2
```

```
/interface bridge port
```

```
add bridge=wlanbridge interface=ether1
```

```
add bridge=wlanbridge interface=wlan1
```

```
add bridge=wlanbridge interface=wlan2
```

```
add bridge=wlanbridge interface=wlan3
```

```
add bridge=wlanbridge interface=wlan4
```

```
/interface vlan
```

```
add interface=wlanbridge l2mtu=1596 name=wlanbridge.110 vlan-id=110
```

```
/routing ospf instance
```

```
set [ find default=yes ] router-id=10.0.255.203
```

```
/ip address
```

```
add address=10.11.0.2/24 interface=wlanbridge.110
```

“Core-bridge” SXT snippet

```
/interface wireless
set 0 band=5ghz-a/n bridge-mode=enabled \
  channel-width=20/40mhz-ht-above country=denmark \
  mode=station-bridge nv2-preshared-key=veryDog \
  nv2-security=enabled ssid=RF-wifi wireless-protocol=nv2 \
  radio-name=client-123 disabled=no
/ip address
add interface=lo0 address=10.10.0.123/32
add interface=ether1 address=10.10.123.1/24
/snmp
set contact="RFIT" enabled=yes location="Backstage Village {55.673115;12.590205}"
/routing ospf instance
set default router-id=10.10.0.123
/routing ospf interface
add interface=wlan1.110 network-type=broadcast
add interface=ether1 passive=yes
/routing ospf network
add network=10.0.0.0/8 area=backbone
```

Automated deployment of configurations

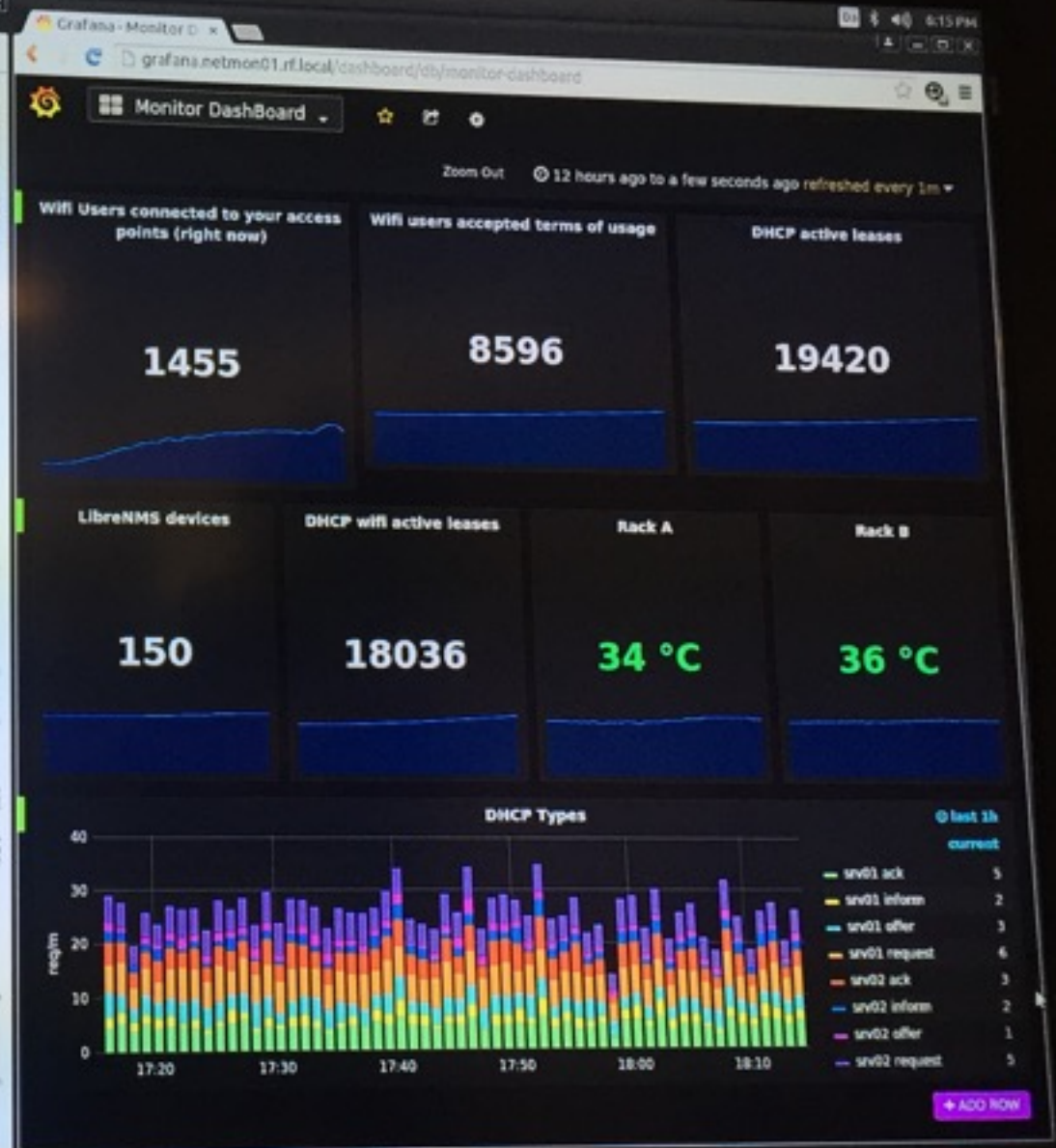
- Had some great ideas for how to do it the past couple of years
- ..what works in the lab, some times does not work in the field
- Some times, theres special cases that needs special treatment
- Ended up rolling back to some semi automated way of creating configuration files and pasting them in via Winbox

Lessons learned

- Radio frequencies and planning can be difficult
 - Works fine to begin with..
 - ..breaks when 100.000 guests suddenly enter the area, often bringing their own noisy equipment
- “Dumb internet connectivity” still requires equipment tracking for physical location (SXT's with GPS, PLEASE?!)
- Automated deployment of configuration might not need to be fully automated :-)
- NV2 (TDMA) is awesome! Low latency and reliable links
- mac-telnet can, and will, save your a**
- PoE injectors and power supplies can be tricky..

Behind the scenes





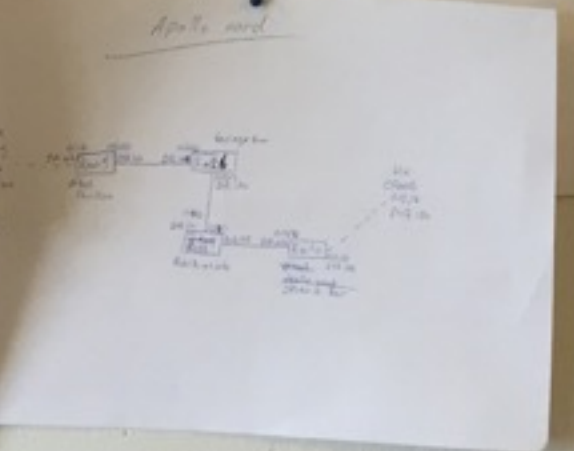
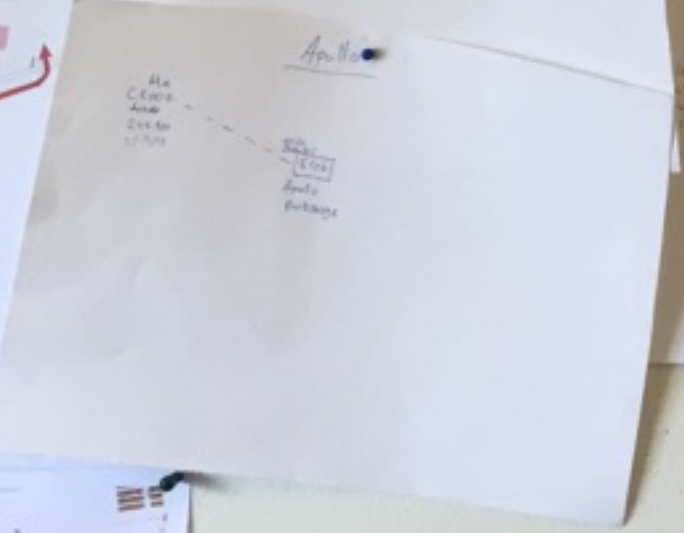
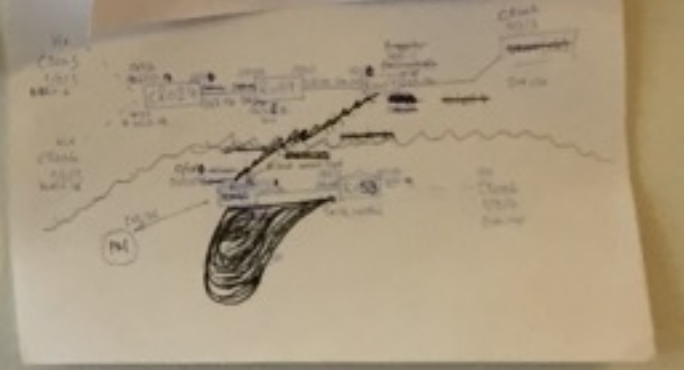
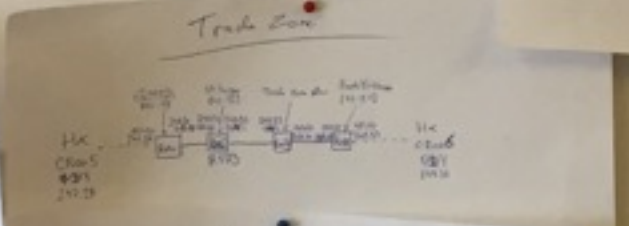
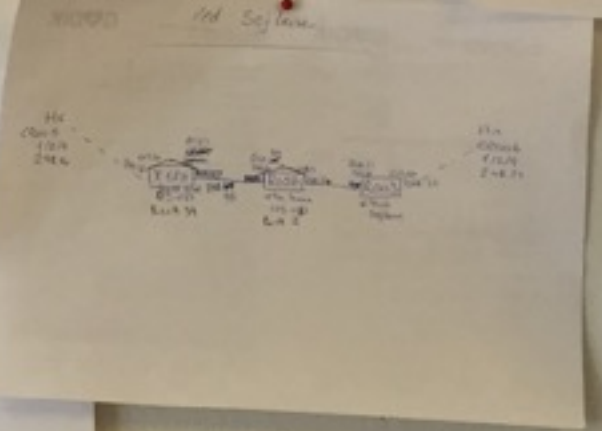
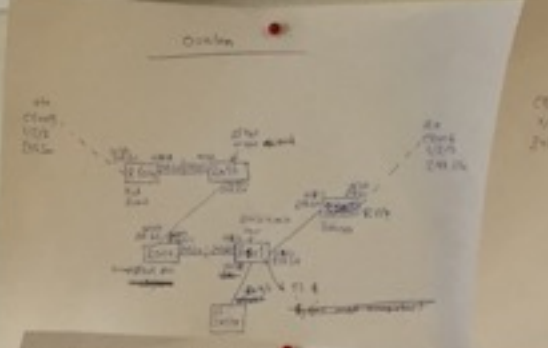
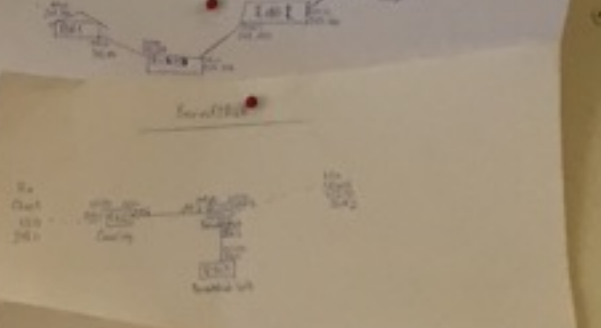
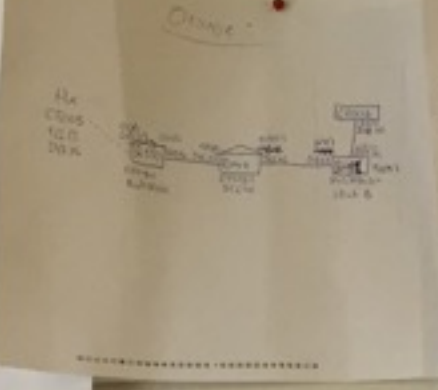
SAMSUNG







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Why volunteer?

some reasons:

- It's 2 weeks of **fun work!**
- Meet a lot of cool and talented people
- A great way to learn new while doing
- Lots of social stuff going on - all the time
- Great for your professional network

TAK!

Questions?

Feel free to drop by and ask for more details about our
setup and volunteering :)