



Martin Vystrčil

Sysrepo in RACOM

Proprietary solution
Netopeer2 & Sysrepo
gRPC, proto, yang
Code generators

RACOM products

- Private company
 - Over 100 employees
 - Global impact
- Narrowband IP routers (since 1990)
 - 10 - 100 kbit/s
- Cellular IP routers (since 2018)
 - 10 - 100 mbit/s
- Microwave links (since 2010)
 - 10 Gbit/s (since 2023)



Similarities

- Web application
 - Manage product
 - Diagnosis of problems
- Many configuration items
 - Some of them in tables
 - Some of them are mandatory
- Linked items with own limitations

Search here

Generic

- > region
- > device
- > term_server_5_prot
- > term_server_4_prot
- > term_server_3_prot
- > term_server_2_prot
- > term_server_1_prot
- / Main
- / EthPorts
- / ExtensionPorts
- / EventSysBootCompleted
- / EventSysRecoveryMode
- / EventSysRecoveryRestart
- / EventSysCnfLost
- / EventSysPurged
- / EventSysFactorySet
- / EventSysDataFormat
- / EventSysCnfUpdate

ComPort_1

Type: RS232

Baud rate [b/s]: 19200

Data bits [No]: 8

Parity: None

Stop bits [No]: 1

MRU [B]: 1500

Enable COM1: Off

Flow control: None

Protocol: None

Idle [ms]: 15

Buffer flush time [ms]: 0

Reset form


Legacy configuration

```
ITEM: RadioIpAddr;  
  name_cli: "IP address";    name_unit: "";  
  comm: "Radio interface - IP address";  
  indexno: 427;  type: uint32_ipv4;  
  disabler: {"seid": "(F:main[-]|I:DeviceMode)",  
    | "constraint":{"notEqual":["Router"]}}  
  
#RadioIpAddr (CNFVER: 13)  
_MODIFICATION: 1;  
indexno: 2195;  type: uint32_ipv4;  
disabler: {"seid": "(F:main[-]|I:RadioIfMode)",  
  | "constraint":{"notEqual":["Router"]}}
```


- Established ~ 2010
- Size is the biggest problem
 - Optimized to bits and bytes
- Saved as binary blob
- **Compatibility layer**
- C++ code generator
- Good enough proprietary solution

Legacy configuration limitations

- Maintenance & development
 - Proprietary language
- Difficult to extend
 - Tables are very difficult to manage
- **Validations are missing**

 **Warning:** Representation of Sent Data has been loaded back into Changes. Please review errors and data and submit them again

22:11:44

 **Error:** Configuration failed consistency check.

- No port assigned to ETH interface.
- [Network interfaces](#)

[Show less](#)

22:11:43

> Close

▼ Show all

Goals



- Unified look & feel of products
- Reuse as much as possible
- Web application ready
- Deliver as fast as possible
- Generate source code
- **Generic validations**
- Easy to understand

Transition under development

```
ITEM: RadioIpAddr;
  name_cli: "IP address";    name_unit: "";
  comm: "Radio interface - IP address";
  indexno: 427;  type: uint32_ipv4;
  disabler: {"seid": "(F:main[-]|I:DeviceMode)",
    "constraint": {"notEqual": ["Router"]}}

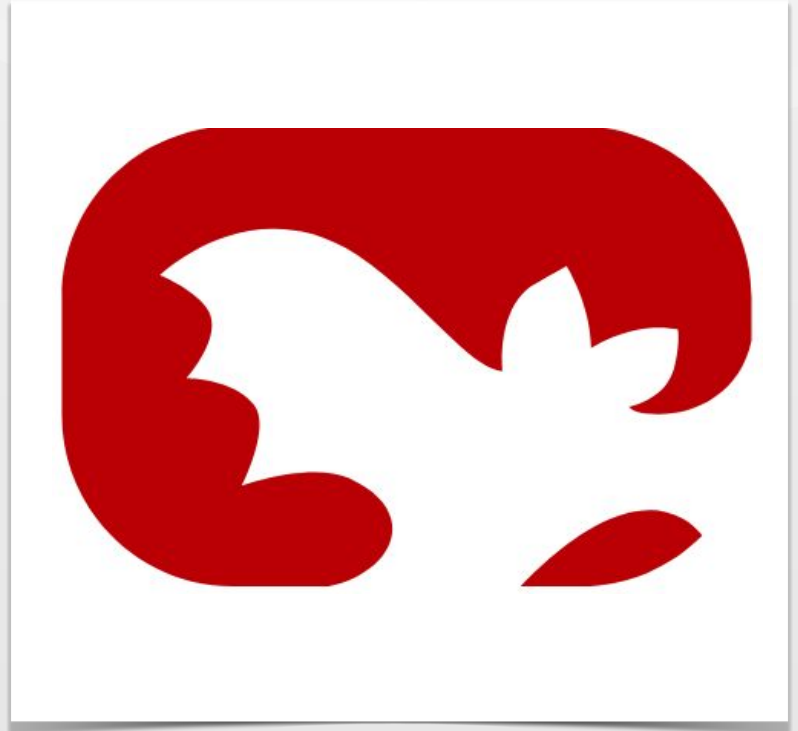
#RadioIpAddr (CNFVER: 13)
_MODIFICATION: 1;
indexno: 2195;  type: uint32_ipv4;
disabler: {"seid": "(F:main[-]|I:RadioIfMode)",
  "constraint": {"notEqual": ["Router"]}}

leaf "RR_RadioIpAddr" {
  type "inet:ipv4-address";
  when "not (/config_data/main/
    RadioInterface/RR_RadioIfMode != 'Router')";
}
```

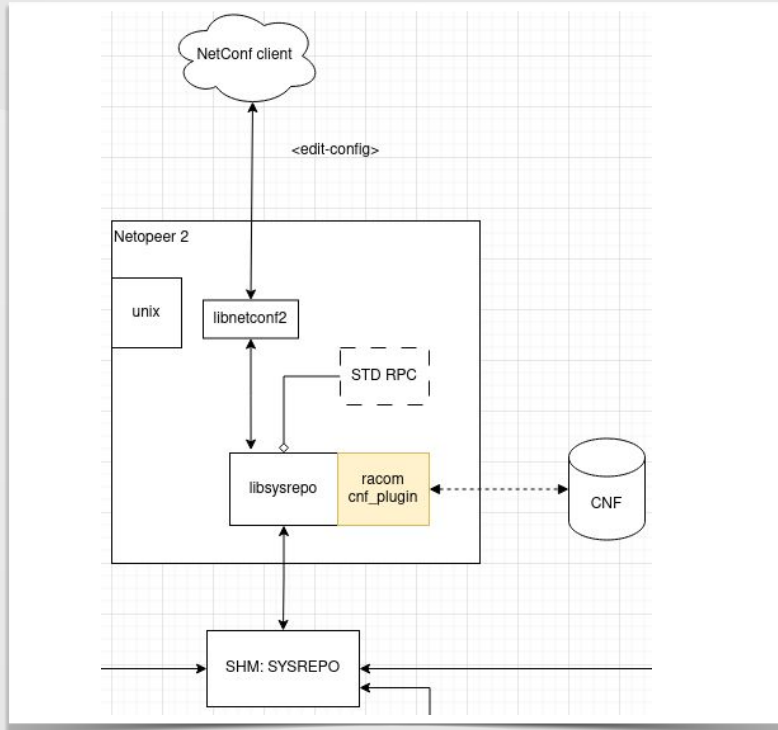
- Statistics
 - 75 tables
 - 394 enums
 - 2 288 items
- No time to stop development
- Coexistence of both systems
- Python utility - *rrygen*
 - *rr* - racom prefix
 - *ygen* - yang serializer / deserializer

Sysrepo integration

- OpenSource projects
 - *sysrepo*
 - *netopeer2*
- Sysrepo datastore plugin



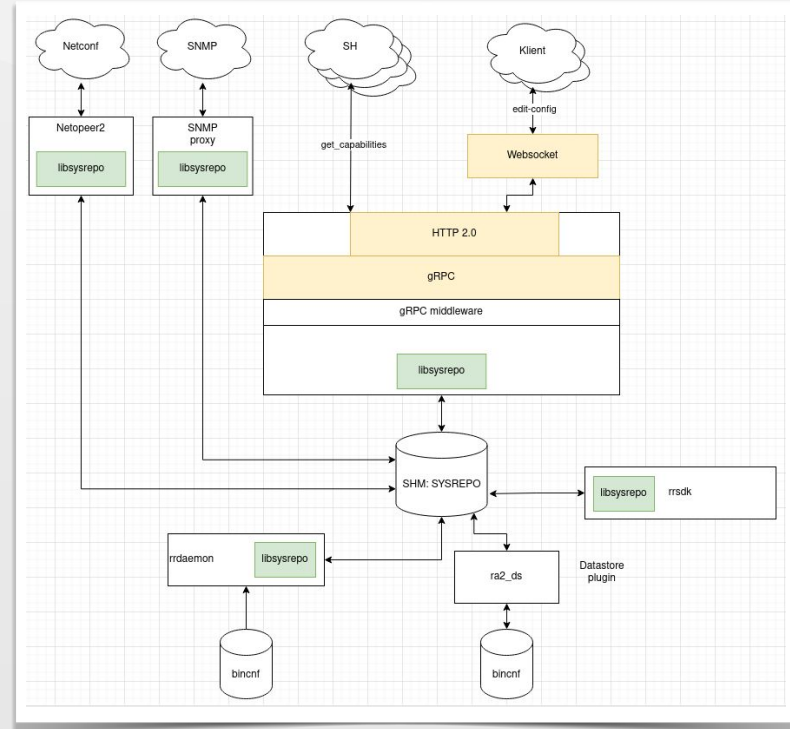
Netconf & narrowband



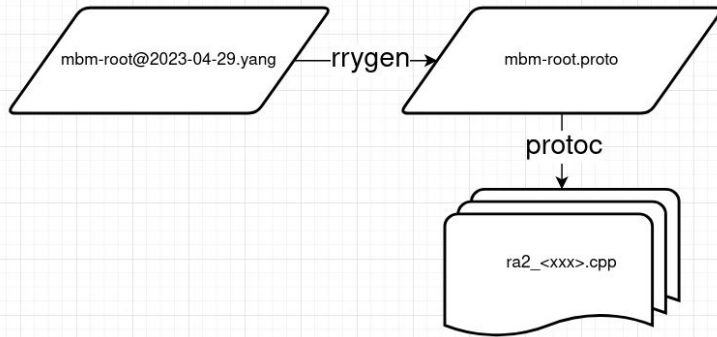
- Standard protocol RFC 6241
 - ssh & xml
- **Narrowband is 10 - 100 kbit/s**
- Netconf xml message contains both keys & values
- Configuration approx 100th kB

gRPC & narrowband

- **Efficiency of transport layer**
 - ID's not keys
- **Protobuf contract**
 - protobuf -> source code
 - protoc
 - HTTP2.0
- **Web access**
 - websocket + proto



Protobuf & yang



- IDLs
- Almost the same
- **Transfer from yang to protobuf**
- Python utility - *rrygen*
 - Use the same utility again

Generic client

Generic administration API: <https://localhost:8080> [Changes to commit](#) [Log out](#)

[Dashboard](#)

- [firmwares](#)
- [commands-invoked](#)
- [network](#)

network

units

id: 1

name

☒ virtual

[Remove item](#)

id: 4

name

☐ virtual

[Remove item](#)

id: 5

name

☒ virtual

[Remove item](#)

[Add item](#)

nodes

id: 1

☒ active

- Web application
- Shared between all products
- Build once, use anywhere
- Based on models

Unknown - compatibility

- How to solve compatibility problems
- Non-trivial compatibility
 - Across versions: 2 -> 8
 - Items in tables
 - Introduction of new limits
 - Replacement of one item with two new

Version 18

Interface		

Interface settings		

Version 19

Interface & settings				

Credit

- Josef Hájek
- René Samek
- Jiří Hruška
- Me: Martin Vystrčil <martin.vystrcil@racom.eu>

Thank you!

Questions?