

# Arnes NOC

## TF-NOC flash presentation

Jože Hanc

joze.hanc@arnes.si



# ARNES as a network

- PoPs: 55 in 51 cities
- datacenters: 2
- organisations/locations connected: 1483

Research	63
University	34
Education	1127
Culture	256
.gov	27

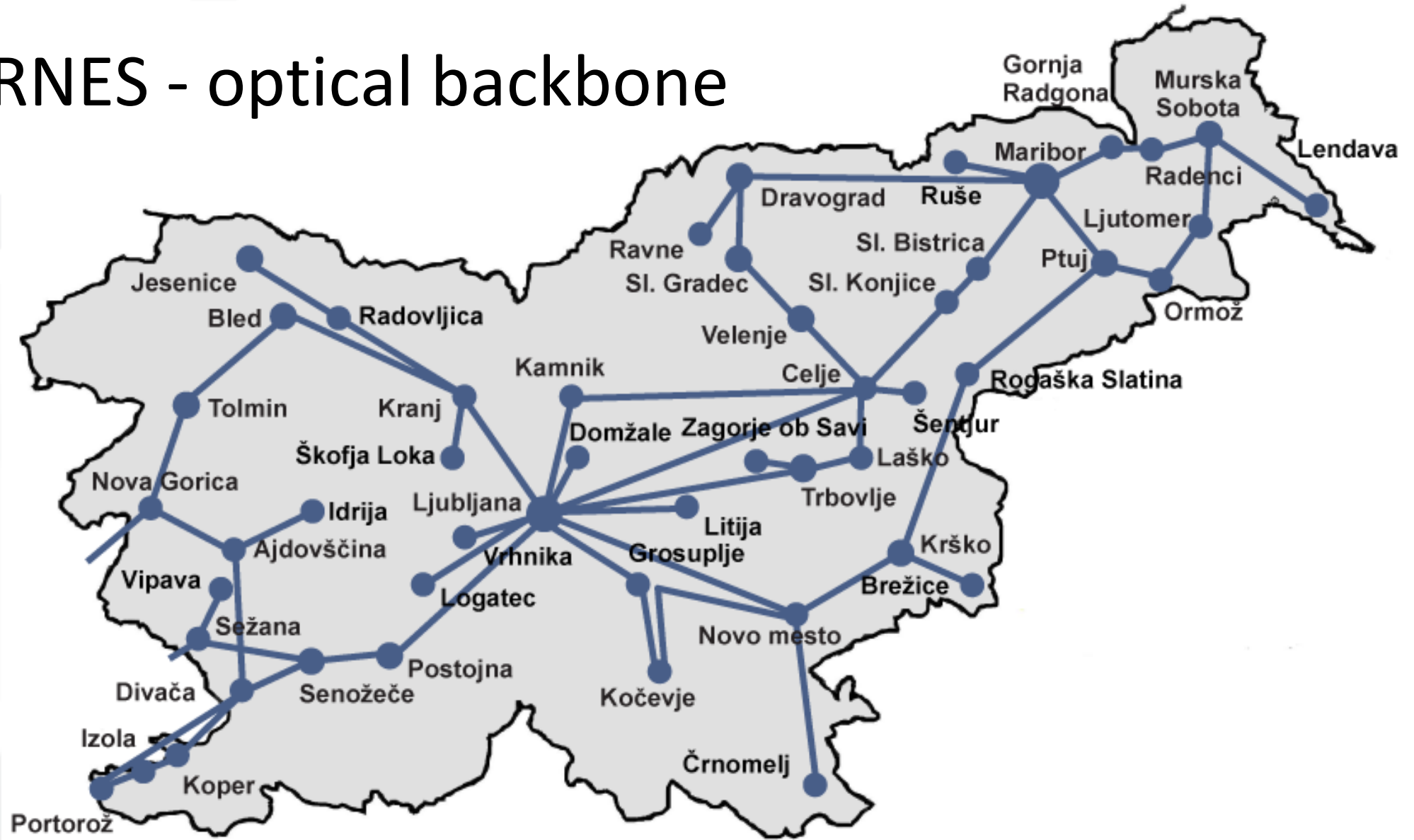


# Arnes as a team – NOC and BB

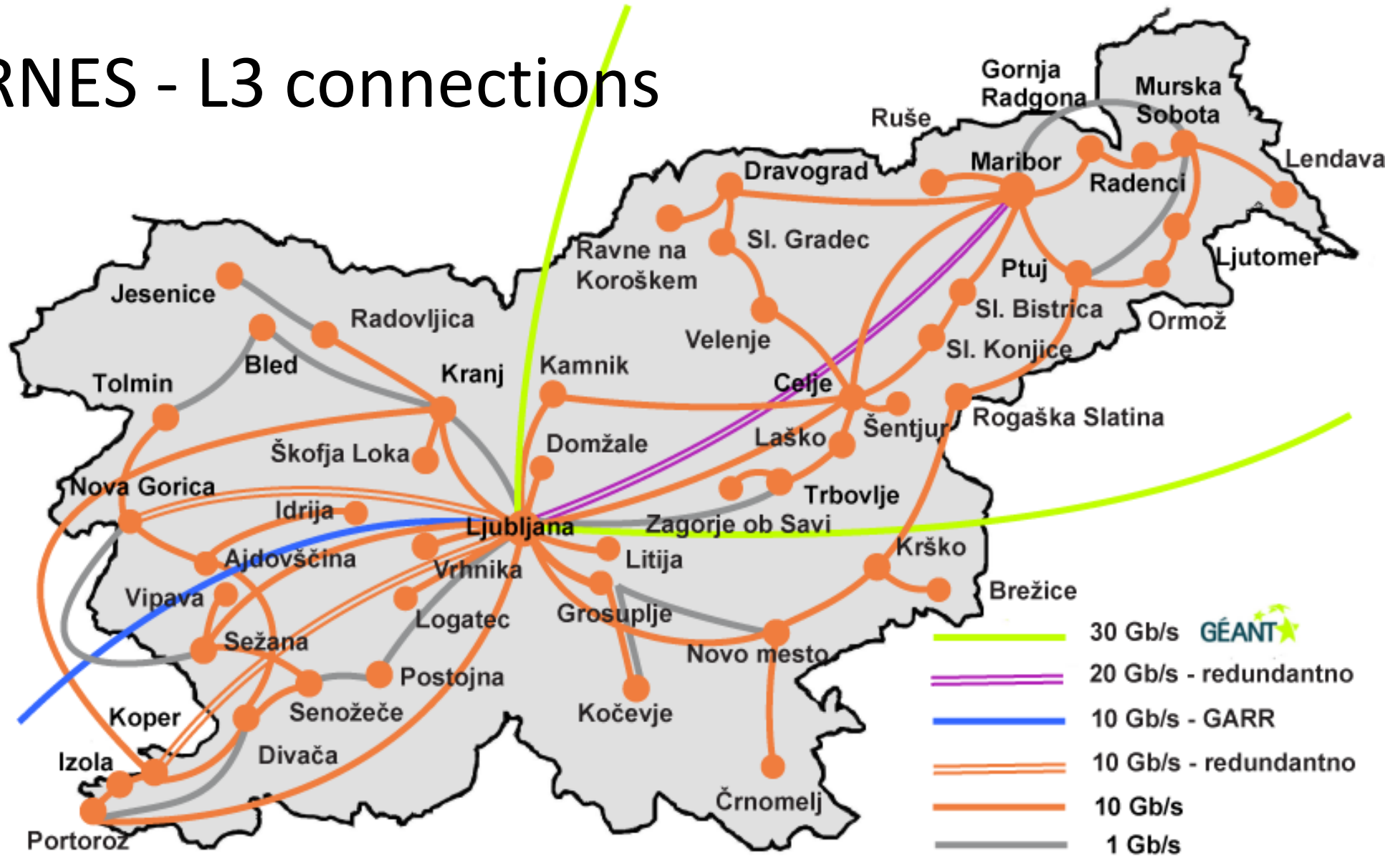
- backbone team – 5 engineers
  - backbone
  - datacenter infrastructure
  - PoPs
  - SIX
- Access team – internally called NOC – 8 engineers
  - access connections
  - CPE distribution and config
  - ACLs, QoS



# ARNES - optical backbone



# ARNES - L3 connections



# Network – fibre + equipment

- backbone
  - leased fibre
  - ADVA DWDM
  - CWDM and BiDi SFP+
  - Juniper + Cisco
- access
  - state owned dark fibre to 750 locations
  - leased fibre
  - xDSL/ethernet and other VPN solutions from ISPs
  - Cisco CPEs



# Network – services and tools

- services
  - connectivity (IPv4, IPv6, L2 VPN (P2P) )
  - eduroam
  - DHCP
  - security/ACLs
  - QoS
  - maintaining CPEs
- tools used
  - Cacti, Kibana, Grafana, Elastic Search, Icinga, NetDOT, Ansible, Napalm, many home-grown scripts



# NOC structure - roles, coverage and responsibility

- backbone
  - engineer on-call 24/7
  - backbone
  - datacenter
  - some major customers (UNI, some institutes, .gov)
  - SIX
- access
  - first and second level from 8:00 till 20:00 (helpdesk)
  - third level from 8:00 till 16:00 (NOC)
  - ACLs/filters, QoS, IPREG
  - troubleshooting
  - brokering of connections





# NOC structure/tools

- scripts – lots of them, developed in-house
- Ansible – mass upgrades and config changes
- In development:
  - Central network database including device config – ANSO
  - dashboards (TV)



# Front end – users and SLAs

- users
  - preschool, primary and secondary education
  - universities and research institutes
  - libraries, museums, archives, state galleries
  - .gov
- agreements, SLA
  - no SLAs towards our customers
  - a signed agreement with each organisation
    - complete and correct organisation and contact data
    - sort of a contract „you are a member of ARNES“



# Inter-NOC communication

- internally
  - OTRS, mail, phone, jabber, walk-in 😊
- outside
  - OTRS, mail, phone (and walk-in, sometimes 😊 )



# Documentation – what and how

- trying to document everything
  - states and procedures
  - work in progress (very early stages ☺):
    - policies, procedures, best practices
- tools:
  - wiki (Confluence)
  - NetDOT



# Documentation

- best practice documents
  - technical recommendation for network cabling and equipment (for new school buildings and for refits)
  - WiFi AP placement in schools (in progress)
- technical requirements for network equipment tenders
  - CPEs, switches
  - WiFi APs



# Ongoing projects

- WLAN-2020
  - eduroam on 955 locations
  - managing LANs on locations
  - central management
    - 15.000 wifi access points
    - 2.000 switches
  - in-house network orchestration solution - ANSO



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