Inside campus networks – AMRES use cases

Bojan Jakovljević

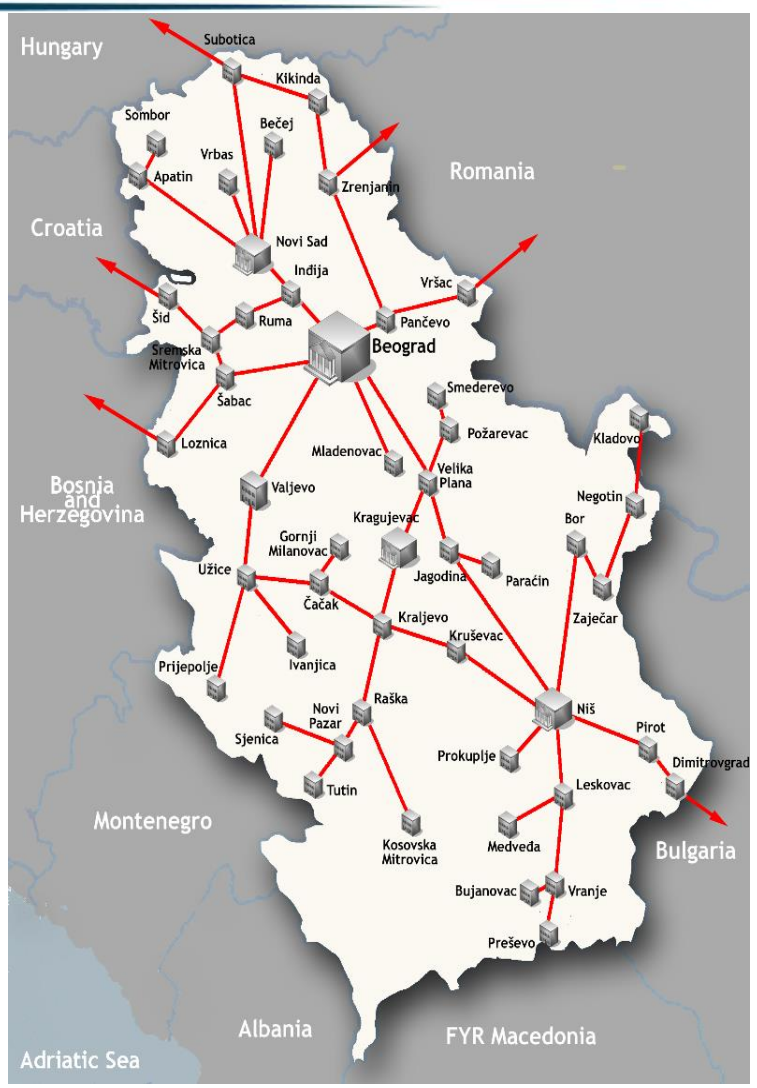
AMRES

Workshop on Network Management and Monitoring

October 2019, Copenhagen

AMRES infrastructure

- 5000 kilometres of dark-fibre links
- DWDM transport network (20 nodes)
- IP/MPLS network (~70 PoPs in 50 cities)
- **Wireless infrastructure** (~**6000 centrally managed access points**, 6 controllers)
- Server, storage and infrastructure for virtualisation (~20 nodes, primary and backup location, VMware platform)
- **Managed CPE routers (~250 institutions)**
- **AMRES school network (~1500 primary and secondary schools** connected via SP managed service)



AMRES institutions and access network

- AMRES connects universities, faculties, research institutes, university hospitals, high schools, primary and secondary schools, libraries, museums and other academic, educational and cultural institutions **(~2000 institutions**).

- Dark-fiber institutions (all type)
  - Self-maintenance (~200 institutions)
  - AMRES managed CPE routers (~250 institutions)

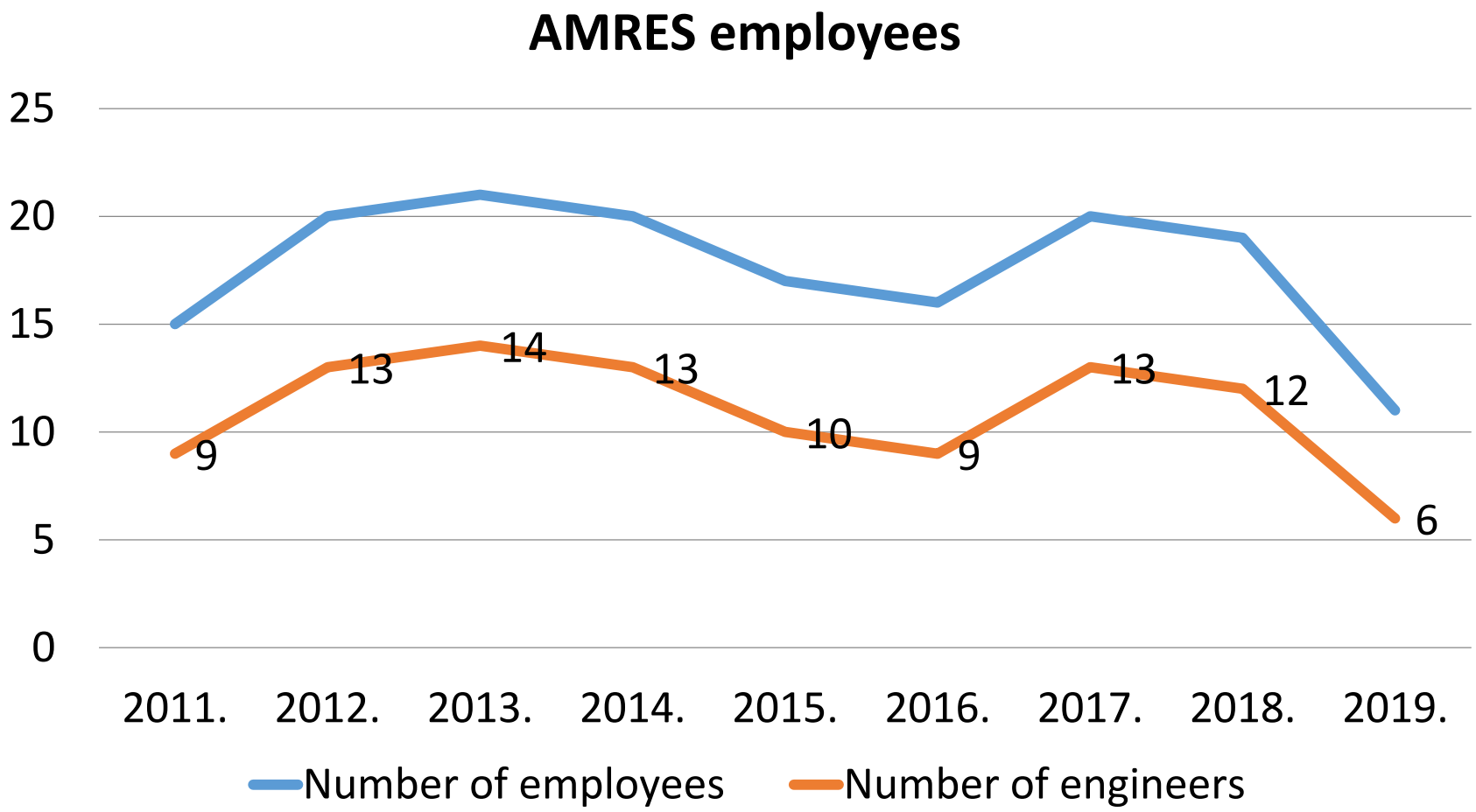
- Service provider managed institution (schools and institutions of culture)
  - Symmetrical service 100/100 Mbps with optical access links (~250)
  - xDSL service (10 – 100 Mbps, ~1150 primary and secondary schools)
  - 3G/4G mobile access (~50)

AMRES infrastructure and services

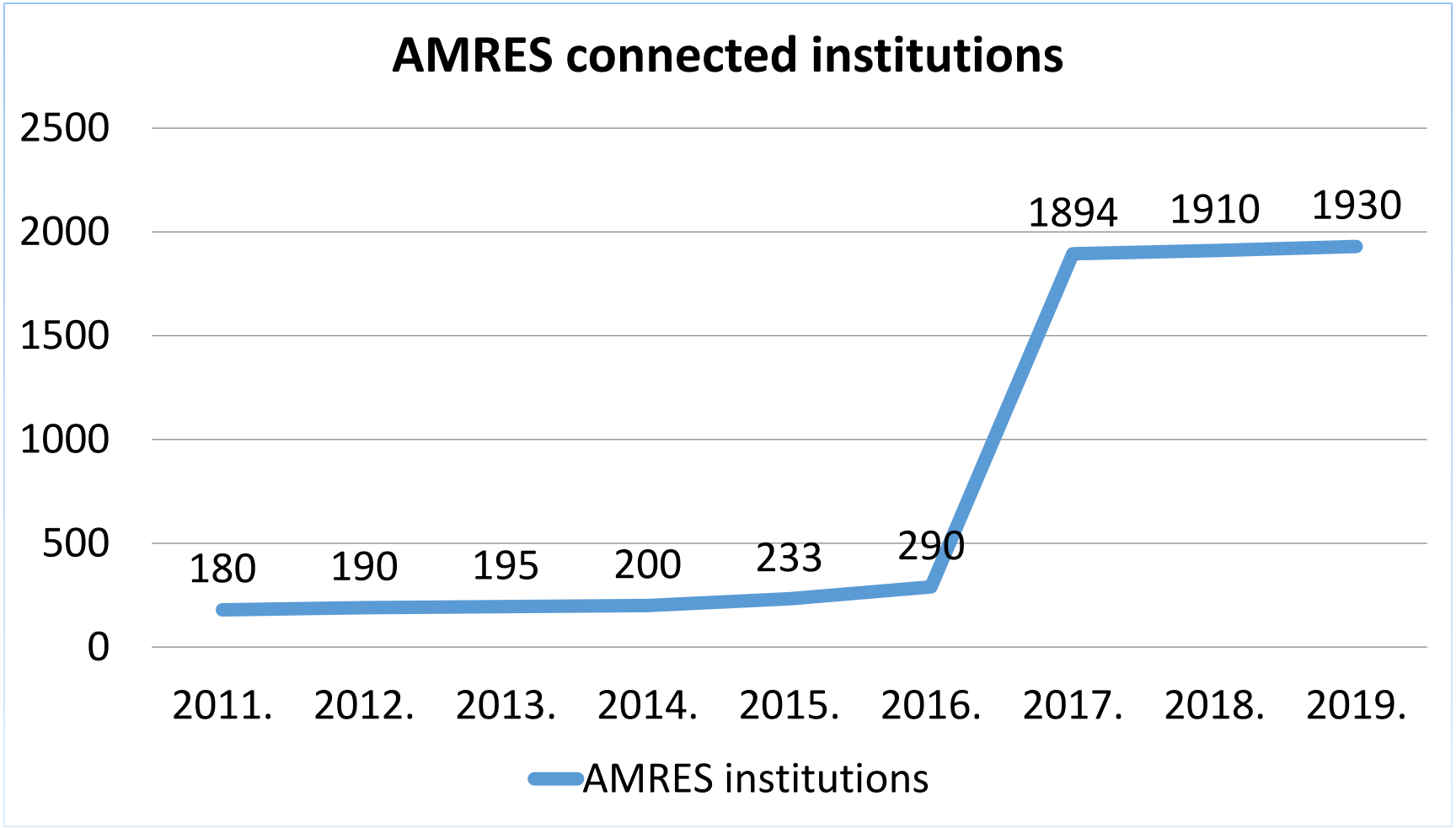
- Usage of AMRES infrastructure and services are not charged

- Support service is based on best-effort principle, without any SLA

AMRES contradictions



AMRES contradictions



AMRES managed CPE router service (started 2013)

- Project started with objective to fulfil AMRES strategic goals to increase number of connected institutions.
- MikroTik RB2011UiAS-RM and RB3011UiAS-RM
- AMRES organise procurement of the equipment and AMRES is owner of it (very low CAPEX).
- Features rich software router with limited performance (L2/L3 functionality, Bridging and switching (VLAN, STP etc.), DHCP Server, Firewall, NAT/PAT, IPv6, Routing (static), SNMP, Scripting).

AMRES managed CPE router service (started 2013)

- AMRES is responsible for configuration, installation, monitoring and maintenance of the CPE routers.
- AMRES provide support for service through the work of AMRES Helpdesk and AMRES NOC.
- Currently operation of all routers are done manually via GUI client (Winbox) or CLI.
- Configurations are standardised and based on configuration templates and could be automated.
- Overall very positive experience in work with this type of devices.

AMRES managed wireless infrastructure

- Started with aim to improve EduRoam service coverage and to increase number of available EduRoam locations in Serbia.
- **1st project (2014)** include ~ 150 APs (Cisco 1142) installed in ~ 20 AMRES institutions that are controlled with 2 wireless controllers (Cisco 5505) installed in AMRES DC. Equipment received as a donation and it is own by AMRES.
- The equipment is installed, configured, maintained and monitored by AMRES.
- **2nd project (2016)** include ~ 900 APs (Cisco 2700) installed in ~ 180 AMRES institutions that are controlled with 2 wireless controllers (Cisco 8540) installed in AMRES DC.
- Ministry of telecommunication procured the equipment with support of AMRES.
- Physical installation and initial configuration were outsourced to 3rd parties (commercial integrators). AMRES is responsible for further management, operation and monitoring.

Project - Building LAN infrastructure in schools

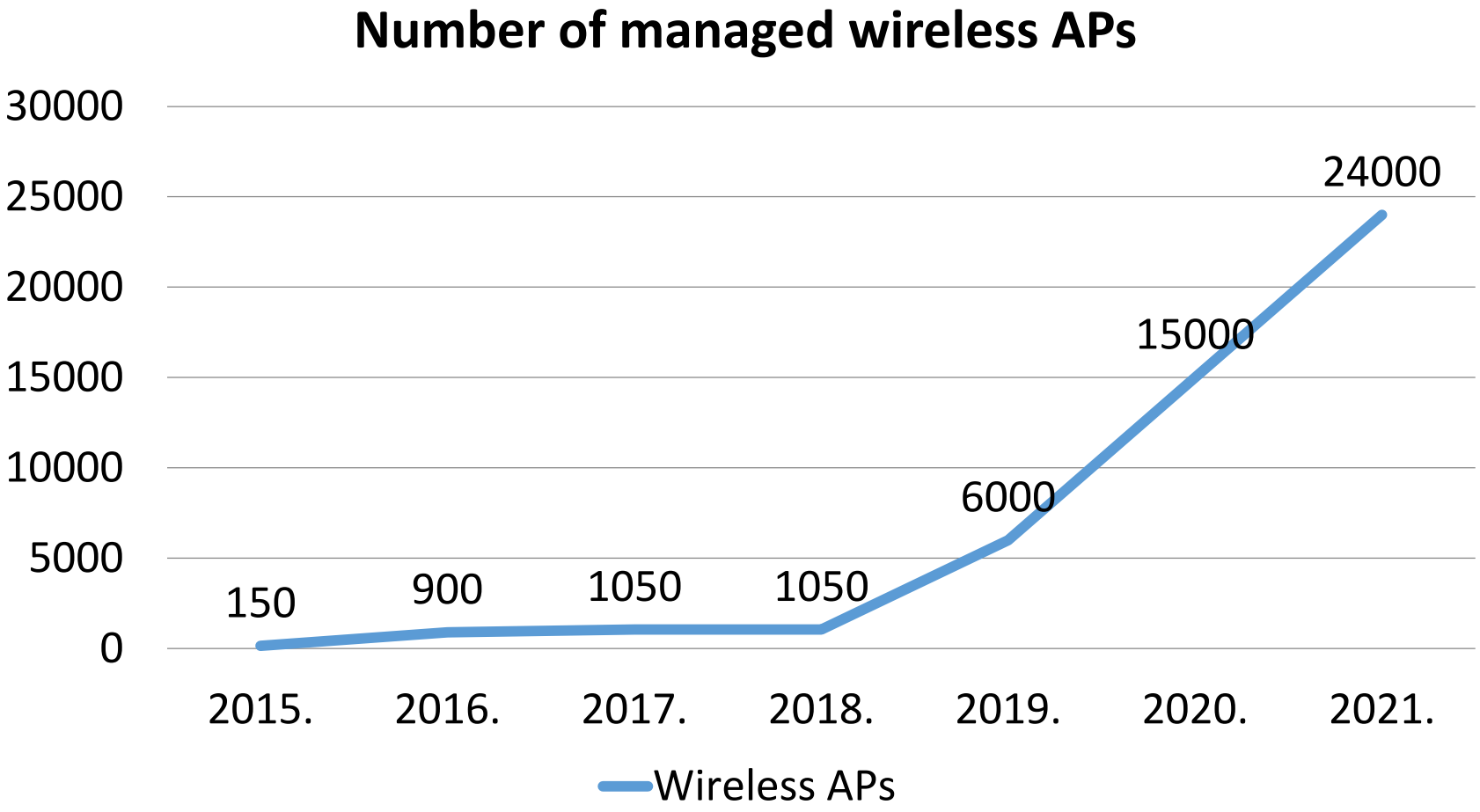
- **3rd project (2019-2021) -** Building LAN infrastructure in schools – include ~ 24000 APs (e.g. Cisco 1800) installed in ~ 1200 AMRES schools that are controlled with 8 wireless controllers (Cisco 8504) in AMRES DC.
- Ministry of telecommunication organize tender for project implementation and procure the equipment with support of AMRES.
- Project implies improvement in passive and active LAN infrastructure in ~ 1200 schools in Serbia.

Building LAN infrastructure in schools

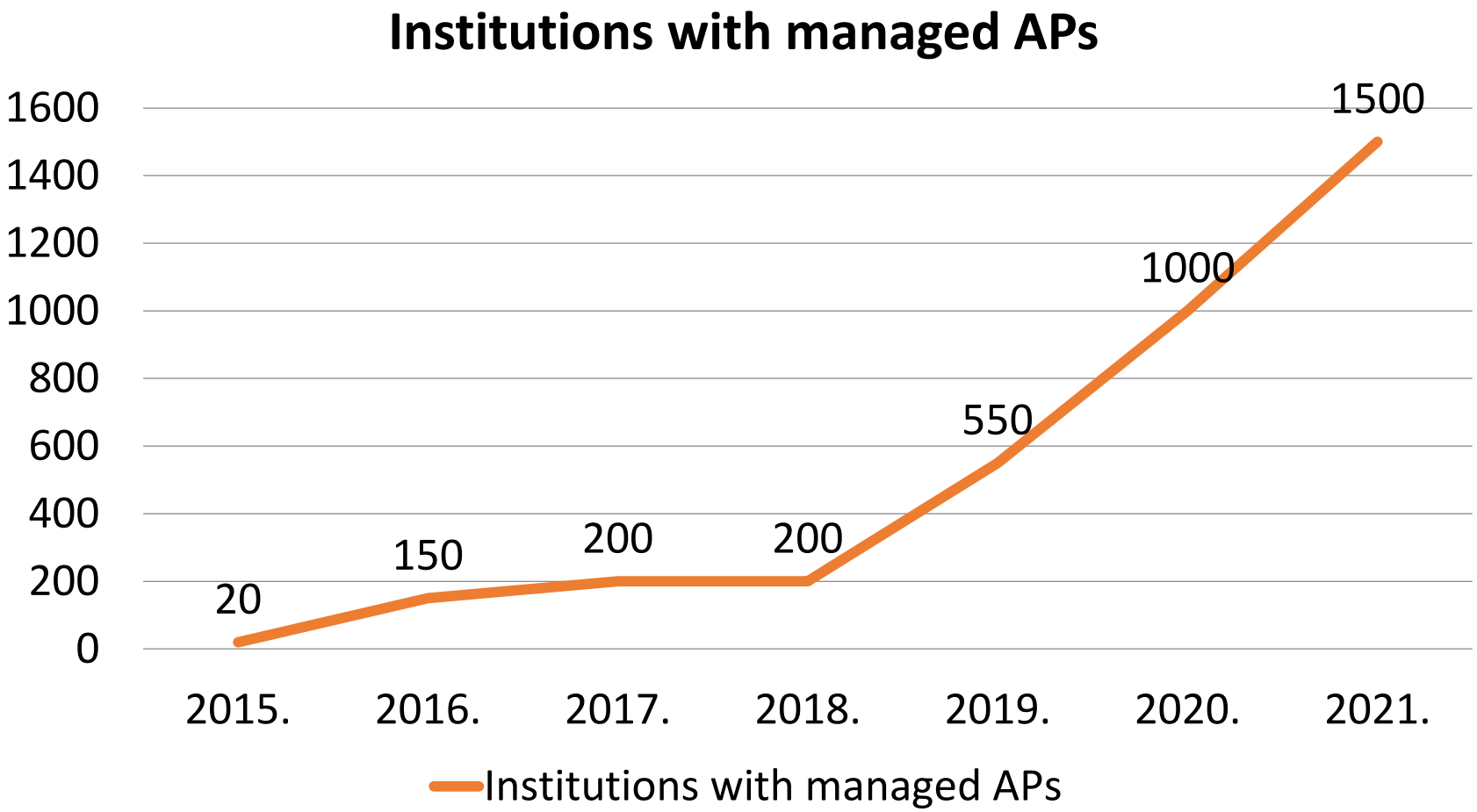
Activities that are part of project include:

- Site survey for all schools.
- Preparing “Project for implementation”.
- Approval for the project for implementation and building the network (cables, racks, UPS, switches – Aruba and Cisco, wireless APs, LAN connection to AMRES CPE etc.)
- Implementation and configuration of equipment on central network location - AMRES DC (firewall, content web filtering, load balancers, wireless controllers, system for monitoring - Cisco Prime infrastructure etc.)
- Centralized identity management solution for the access to the infrastructure and services.
- Final documentation (e.g. “Project of the executed object” etc.)
- 1st level support for the installed equipment in the schools for 3 years.

AMRES contradictions



AMRES contradictions



Trends - Outsource for outsourced services

- **Number of requests and need for support and consultancy from AMRES members are increased.** Especially from less “powerful” institutions (schools, libraries, smaller faculties etc.) with lack of knowledge.
- As a result from **Serbian ICT market development** and **imposed administrative barriers to the hiring** process in AMRES, number of available engineers constantly **decreased and our possibility to satisfied strategic opportunities** are impacted.
- Potential benefits from **service provisioning on orchestrated and automated way** become obvious but development of appropriate solution and transition processes to new solutions **require increased resources in the short and medium term period**. This have introduced the new challenges ahead of our already overloaded NREN responsibilities.
- **Outsource for outsourced services** seems like the only solution for us in the near future.

GÉANT

Networks · Services · People

www.geant.org

This work is part of a project that has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 691567 (GN4-1).