NREN operation in extraordinary circumstances

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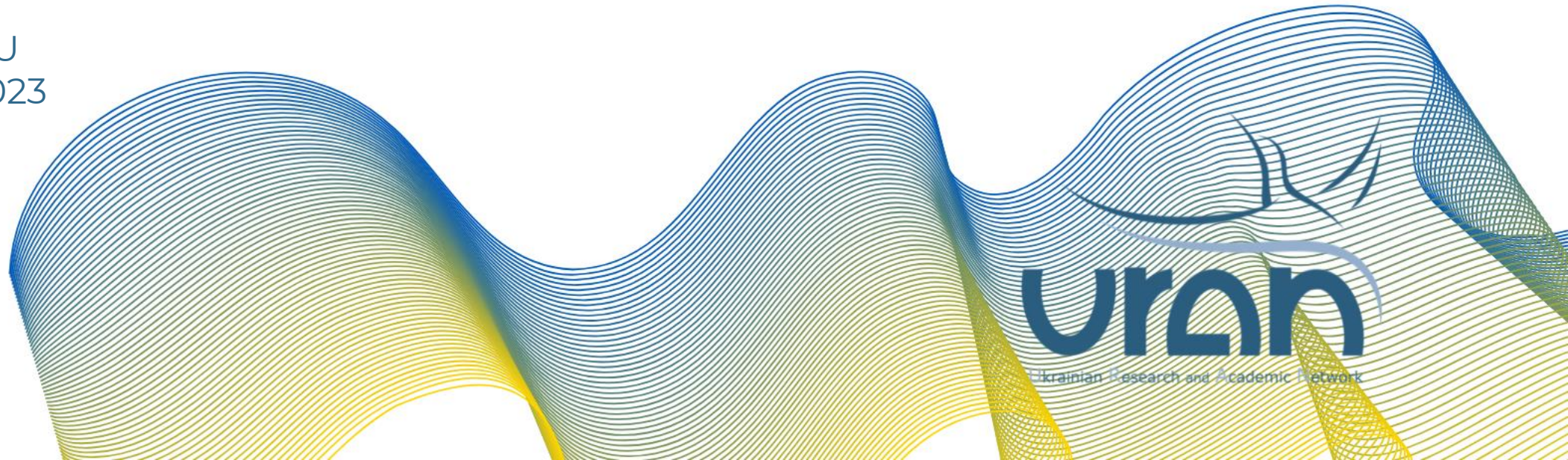
CYBERDAY.LU
12 October 2023



URAN – NREN of Ukraine

Before the full-scale war (24 February 2022)

28%
R&E entities of Ukraine

2,204,000 GB
overall data volume per month

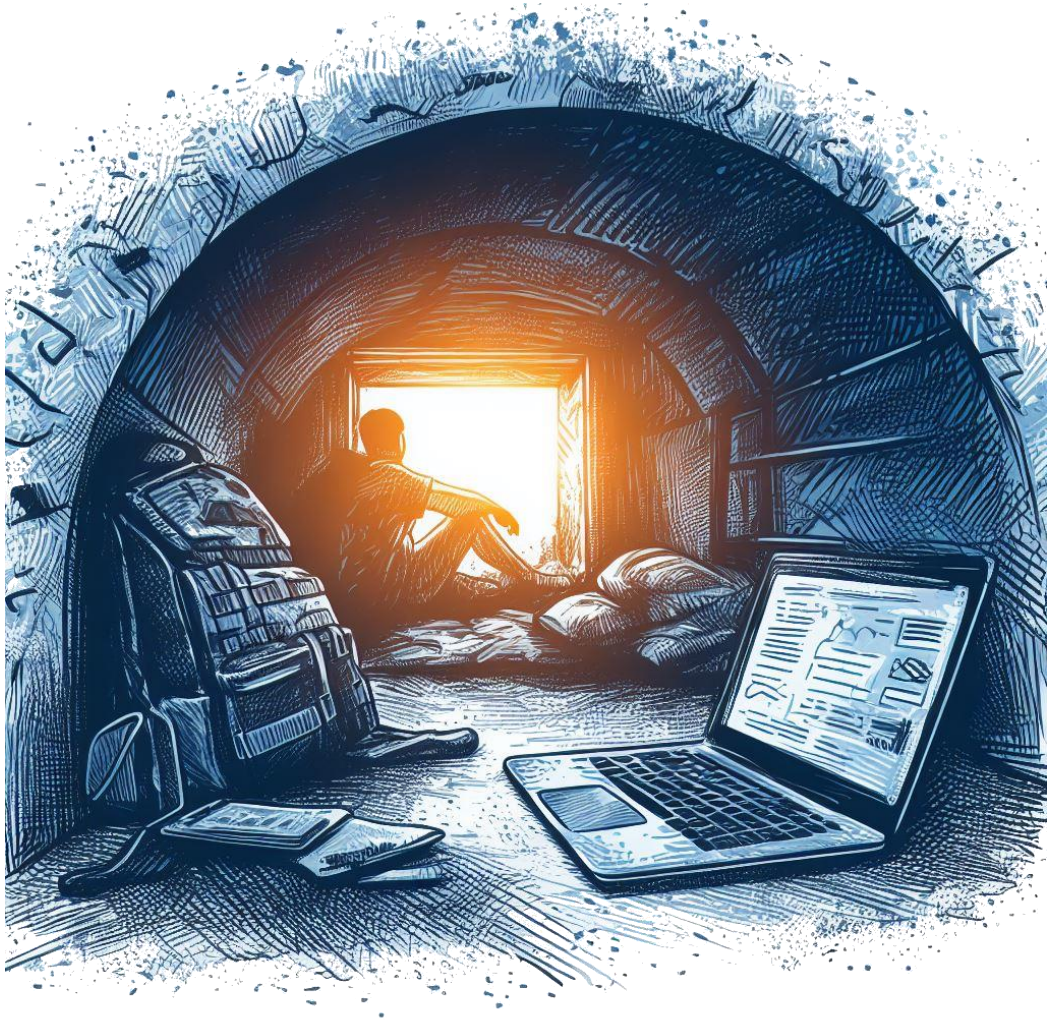
80 km
international network

450,000
academic users

6.5 Gb
average speed

224 km
national network

Operating in war conditions: adaptation



Staff safety

- relocation to safer places Ukraine or abroad;
- weekly online meetings;
- support from GÉANT colleagues

Operating in war conditions: adaptation

Remote mode of operation

- network damages, equipment loss, impossible to get to the office;
- for remote control of equipment – eduVPN;
- for team communications – eduMEET + Telegram

Electricity as the blood for networking

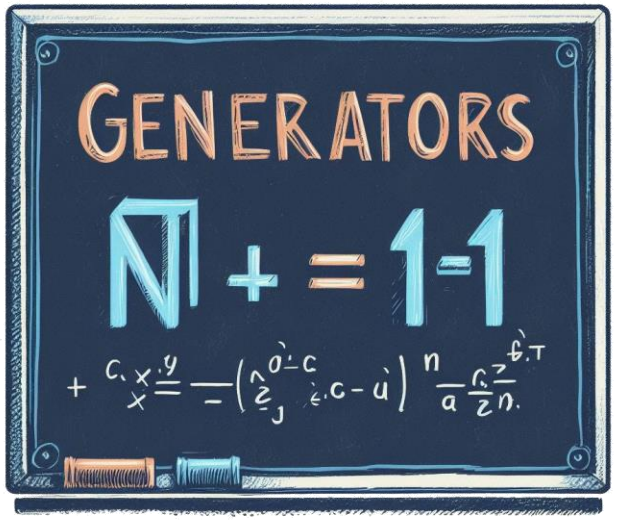
Autumn-winter 2022-2023

- 40% of critical energy infrastructure in Ukraine was ruined;
- emergency blackouts up to 12 hours per day;
- diesel generator broke down;
- URAN main node without backup power - users do not receive services during blackouts.

Electricity as the blood for networking

Lesson

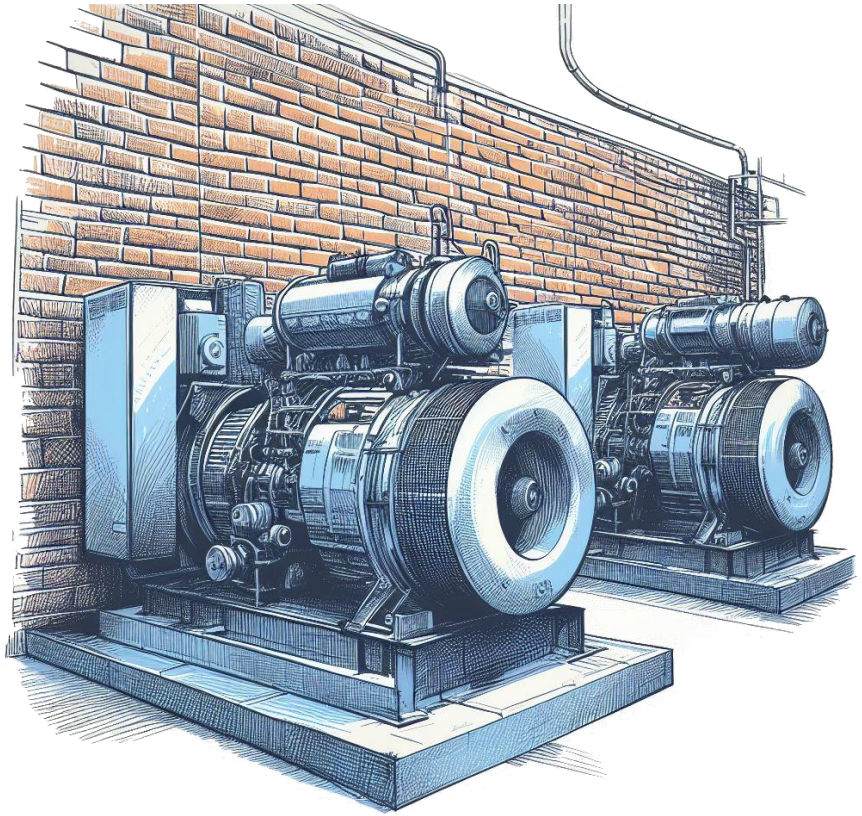
The number of your power backup units should be N+1 where N – is the actually needed quantity.



Challenges

- diesel generator broke down, impossible to restore;
- new generator impossible to buy;
- critical services (DNS) inaccessible;
- data centre recovery up to 5 hours (each time);
- asynchronous power cuts of different nodes.

Electricity as the blood for networking



Work on the generator

- replenishing fuel – 1-2 times a week;
- extra generator from abroad bought with the help of the GÉANT community;
- money for a new generator – from the Vietsch Foundation;
- hopefully, we are prepared for the coming winter.

Changing the network architecture

Migration to the passive CWDM switching

- network becomes less impacted by the asynchronous power cuts of different nodes;
- universities with electricity supply get uninterrupted access to the services, the GÉANT channels and the Internet;
- money for the migration process – from the Vietsch Foundation.

Cyber security

CloudFlare against malicious traffic

- global network of servers that act as a proxy between your website and visitors;
- automatically mitigates security risks using its Web Application Firewall and DDoS protection;
- improvement of website speed.

Cyber security

Mitigation of the massive DDoS attacks effects

- strong UDP firewall rules and BGP blackhole routes;
- help of the National Cyber Police and the Military Cyber Police.

Network monitoring system

GÉANT Network management as a service

- before: internal links between the nodes were disrupted by unsynchronised power outages;
- after: out-of-band network management environment independent from the internal network and accessible from anywhere;
- after: access the internal network monitoring system from any mobile phone via eduVPN and get a comprehensive overview of the nodes' status.

Conclusions

Addressing the challenges

- One generator is not enough.
- Bare metal servers for critical services.
- CWDM technology.

The safety of people is the priority. It is provided by remote mode of operation which is provided by GÉANT services

Thank you