

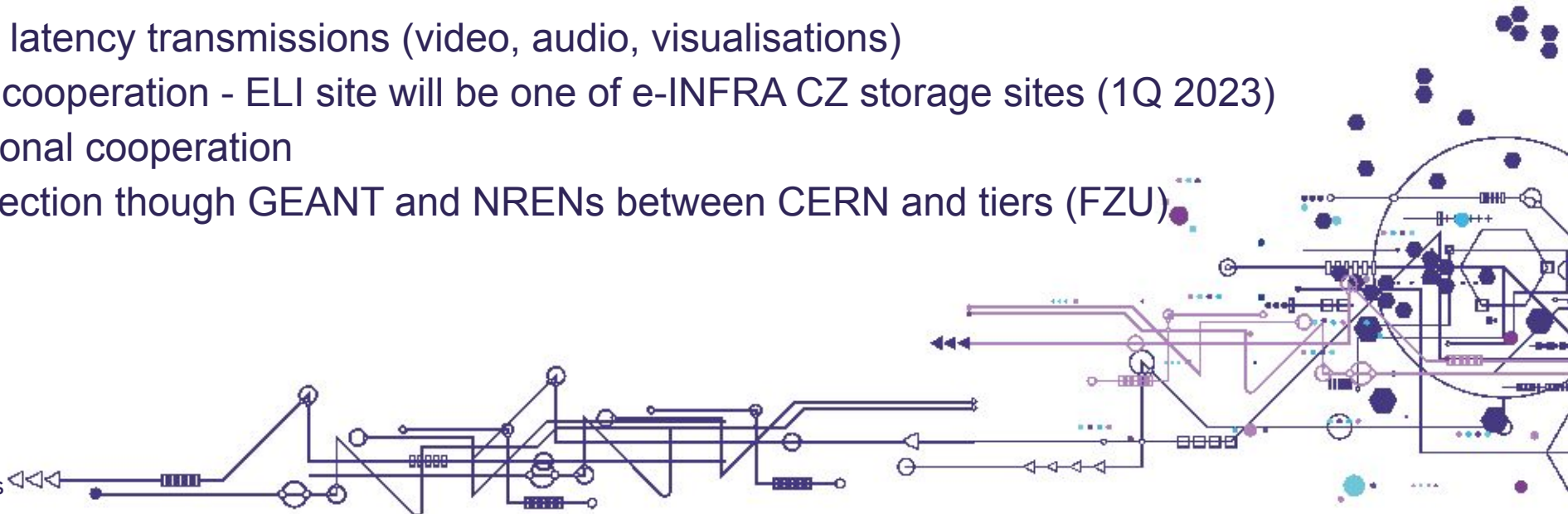
Connectivity and network services

ELI ERIC 23. 11. 2022

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Introduction

- Not just services but tight cooperation
- Reveal your plan and needs in advance, so we can discuss and prepare
- We reveal our plans, so you can image what we can do
- Discussion is the key - we are partner not just service provider
- But we care about quality of service
- We carry out own research and development
 - Time/Frequency, QKD,
 - Security
 - High quality, low latency transmissions (video, audio, visualisations)
- One of the results of cooperation - ELI site will be one of e-INFRA CZ storage sites (1Q 2023)
- GEANT and international cooperation
- LHCONE - interconnection though GEANT and NRENs between CERN and tiers (FZU)

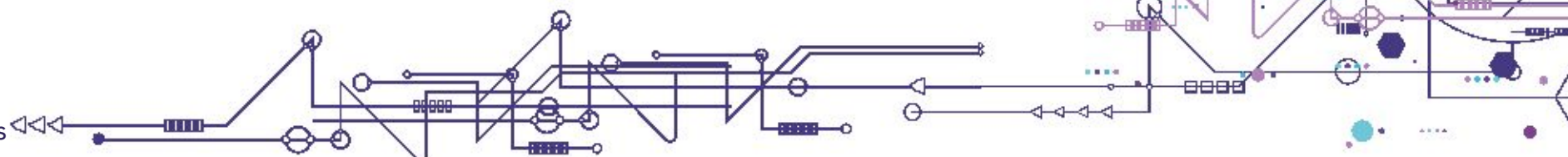
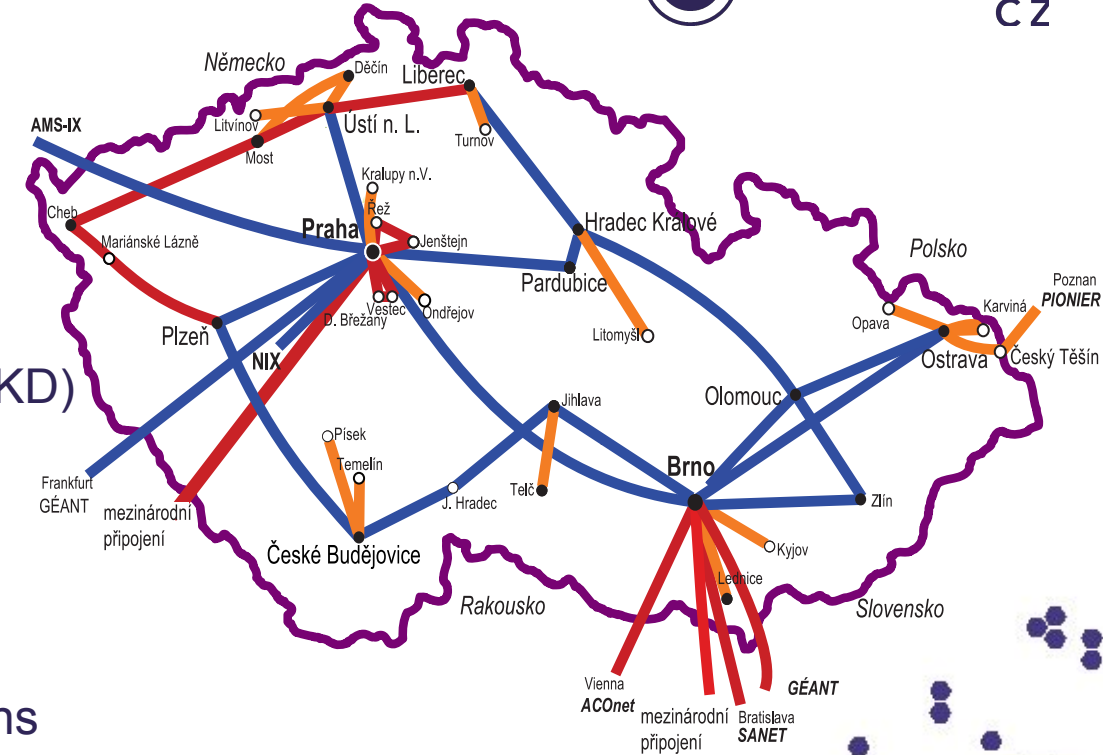


CESNET3 – Basic Information

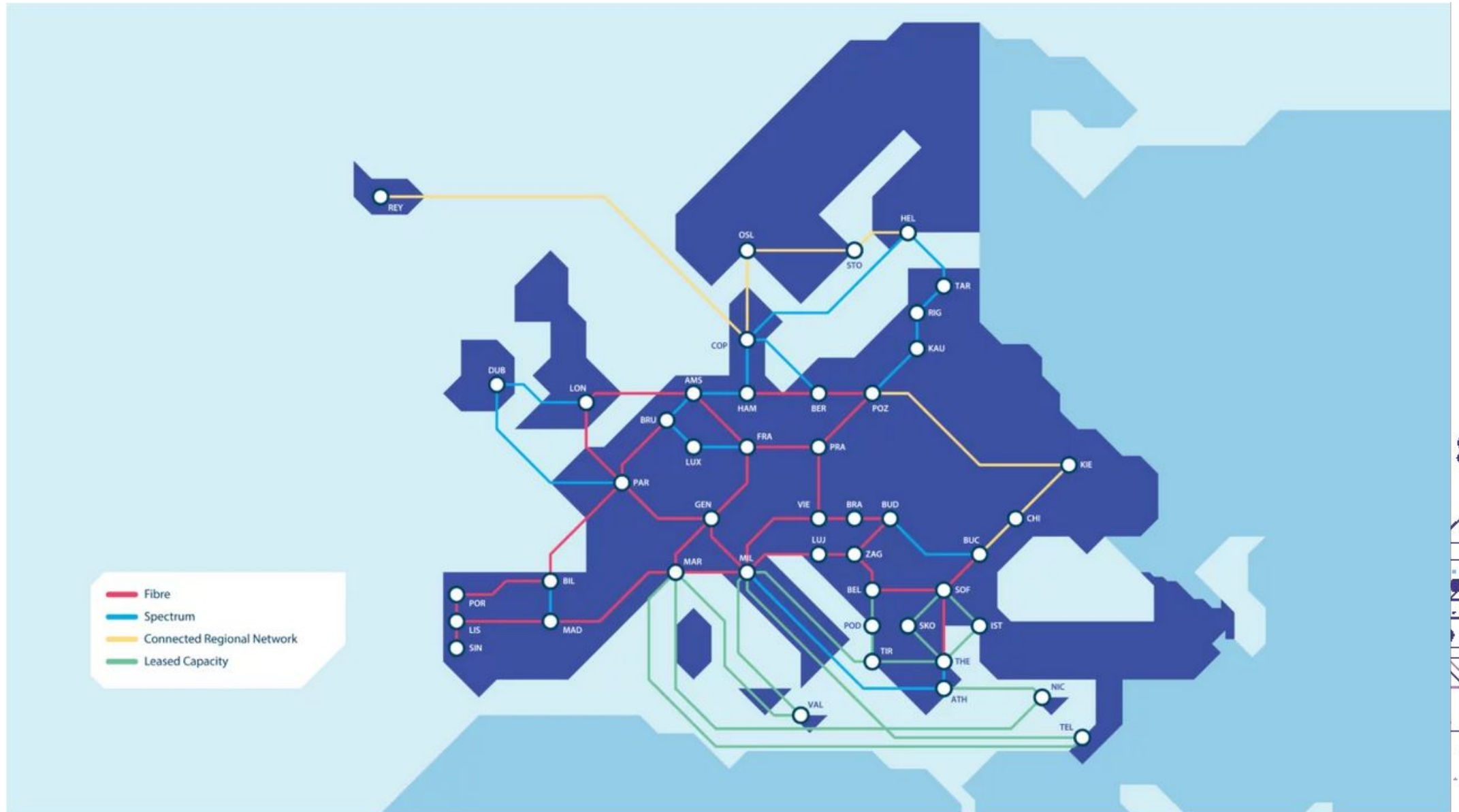


Network part of complex e-infrastructure

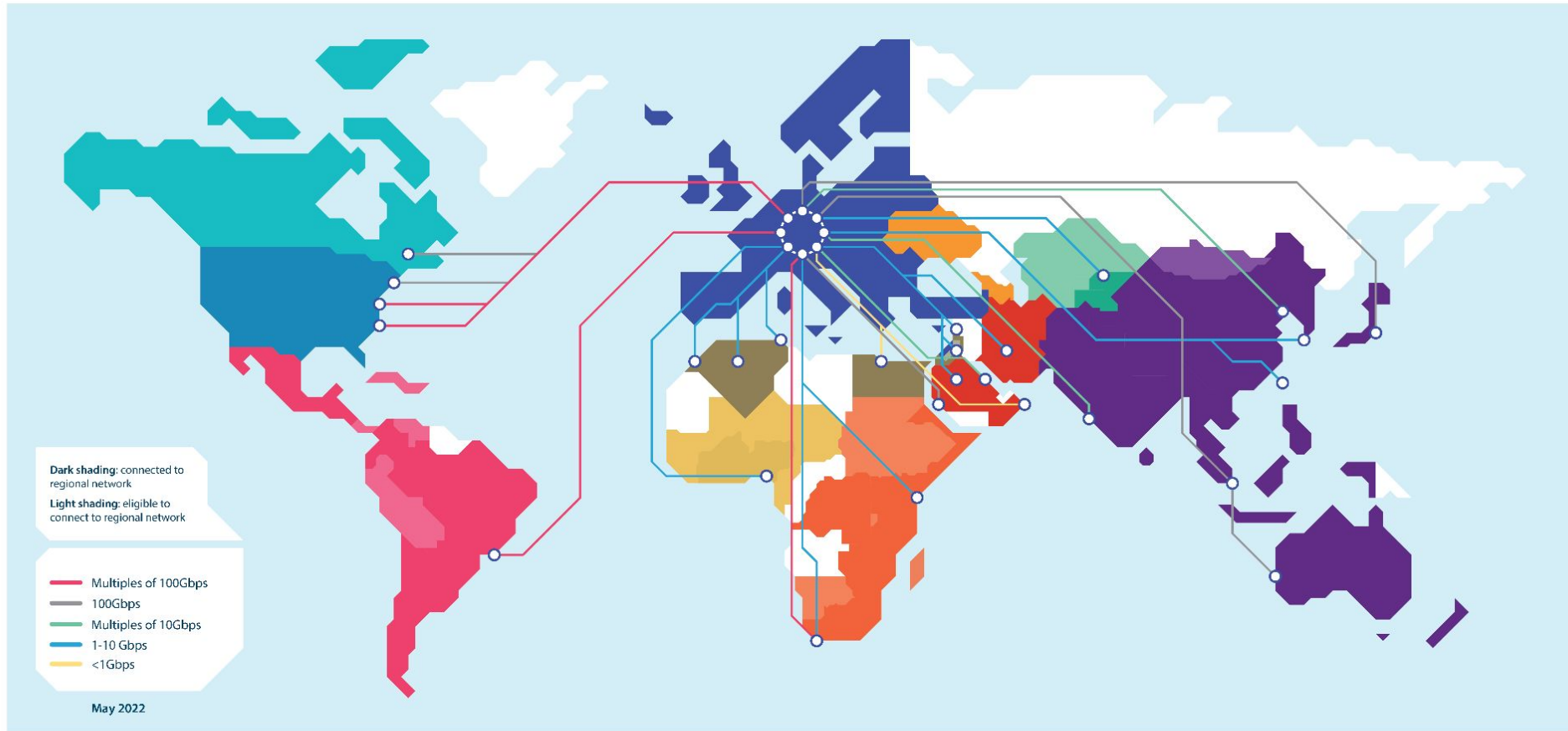
- Concept of three layers
 - Physical - more than 6000 km of fibers (leased)
 - DWDM - effective use of the fibers, dedicated optical channels, special signals (precise time, frequency, QKD)
 - IP/MPLS
 - IPv4/v6 dual stack, unicast, multicast,
 - symmetrical connection with redundancy,
 - without limits on legitimate traffic,
 - ready for high throughput, low latency applications
- external connectivity over 400Gb/s
- E2E service like LHCONe, MS ExpressRoute
- Critical infrastructure of the state
- Emphasis on the network security (layered defence mechanisms)



GEANT – European Backbone



AT THE HEART OF GLOBAL RESEARCH AND EDUCATION NETWORKING

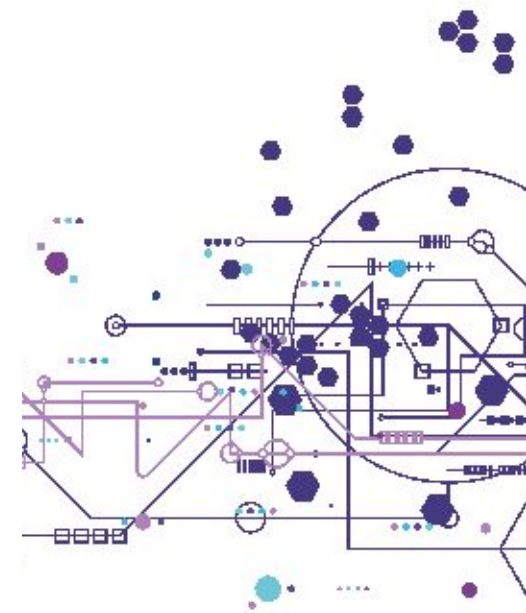


Dark shading: connected to regional network
 Light shading: eligible to connect to regional network

— Multiples of 100Gbps
 — 100Gbps
 — Multiples of 10Gbps
 — 1-10 Gbps
 — <1Gbps

May 2022

Canada & USA	Latin America	Europe	North Africa & Eastern Mediterranean	West & Central Africa	Eastern & Southern Africa	Central Asia	Asia-Pacific	Other R&E Networks

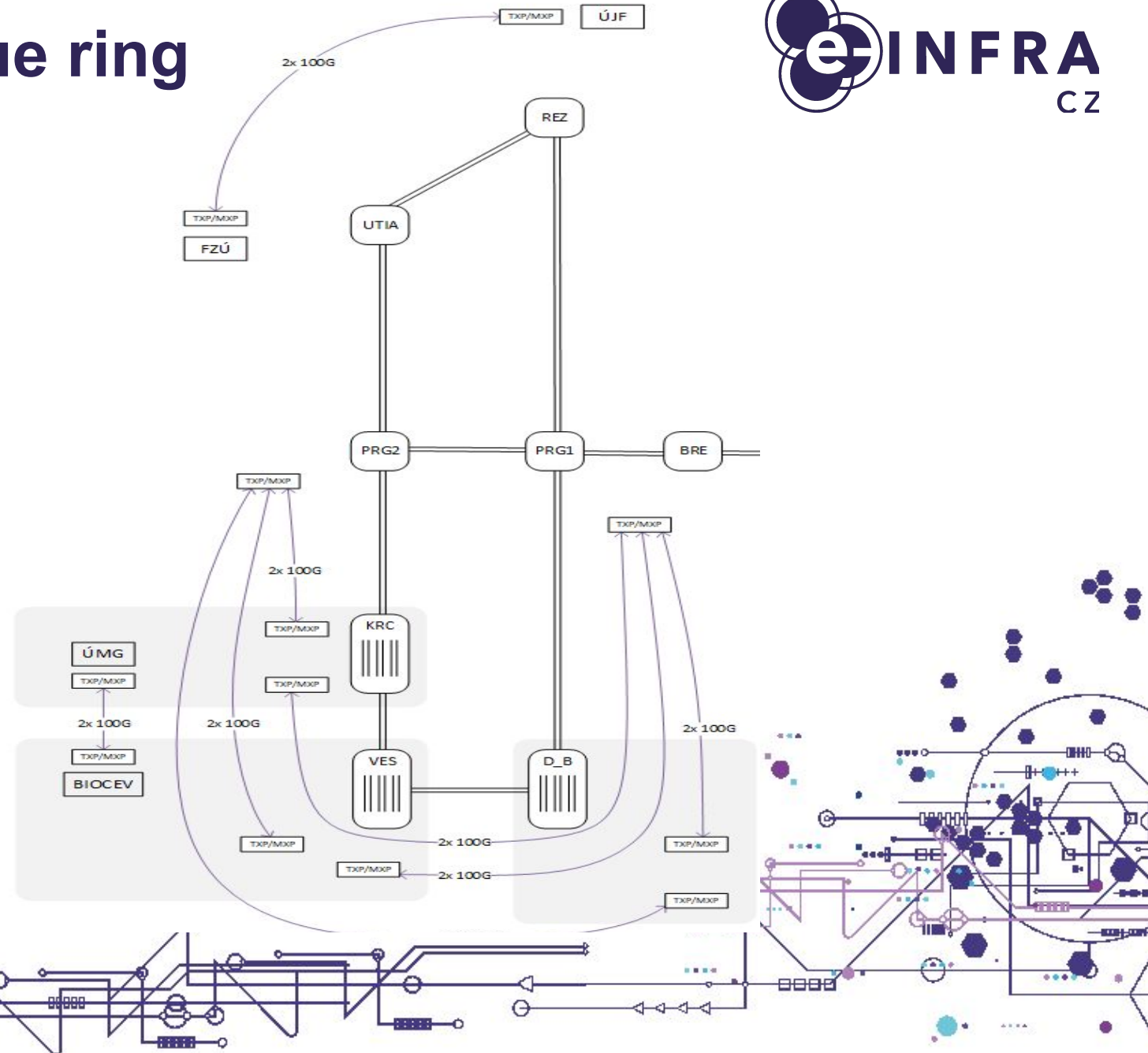


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CESNET3 – Future Prague ring

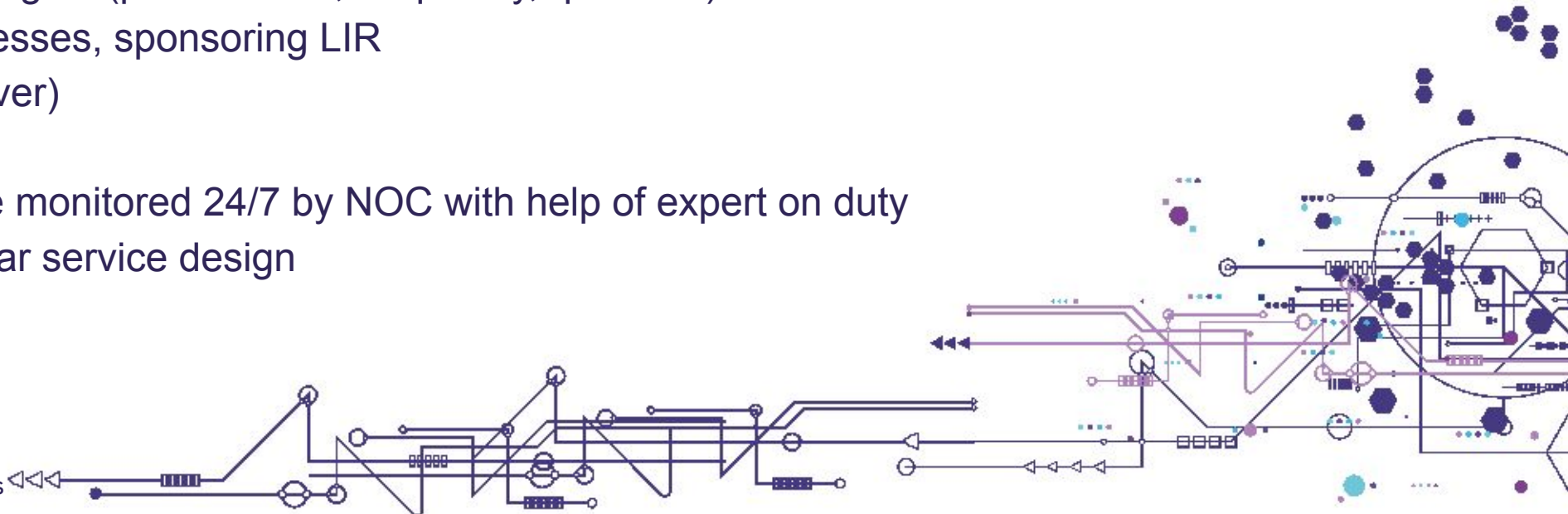
- Mid 2023
 - 100Gb/s with redundancy
 - with possible capacity upgrades
- IP and non data services
- connecting users and partners
 - through main backbone
 - through GEANT and CBFs
 - through other external peers



CESNET3 – Services

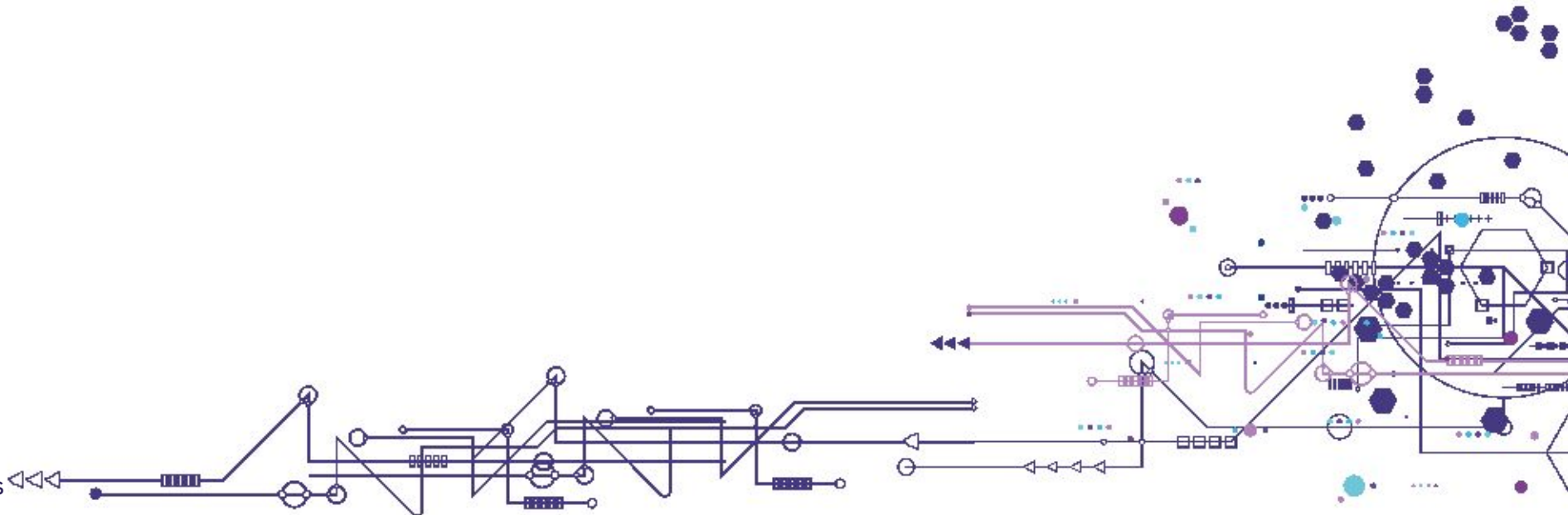
- Network backbone interconnection (lines, redundancy, capacity)
- International interconnection (GEANT, CBF, IXes, MS ER, LHCONE, ISP)
- National interconnection (NIX, CMS,)
- IP services (IPv4/v6 Traffic routing, unicast/multicast, BGP Anycast, ...)
- Layered network defence mechanism with possible user definition of rules/limits
- Dedicated overlay networks (VRF) with additional defence layer
- Optical transport (spectrum as a service), international reach through GEANT
- Transport of special signal (precise time, frequency, quantum)
- Allocation of IP addresses, sponsoring LIR
- DNS (secondary server)

- Network services are monitored 24/7 by NOC with help of expert on duty
- Dialog about particular service design



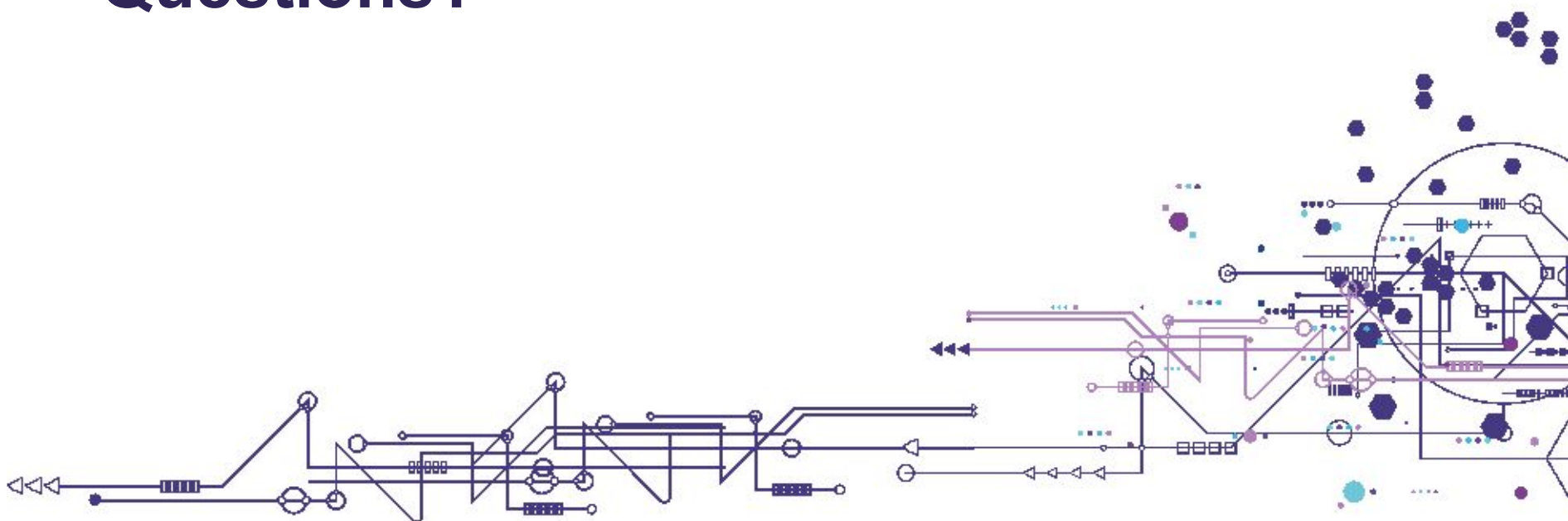
Future steps in the network evolution

- Gradual upgrade of capacity (according to usage and expressed needs)
- Gradual upgrades of equipment
- Further automation steps in automation
- SRv6 - with tight cooperation with power users
- New approach in the monitoring (streaming and in-band telemetry)
- Network protection evolution
- Human capacity for advanced support of large transmissions

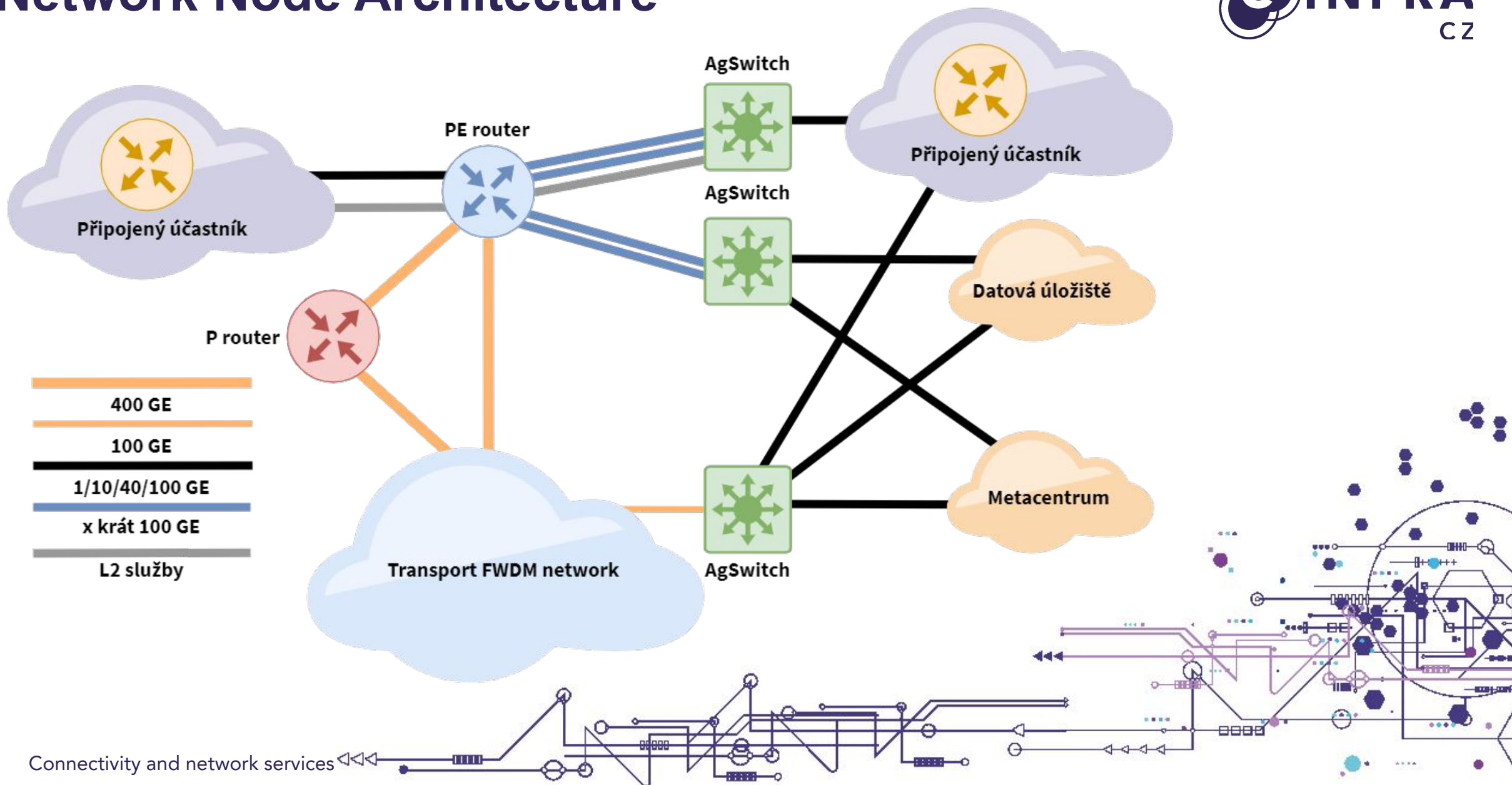




**Thank you
Questions?**



Network Node Architecture



CESNET3 – National Backbone

