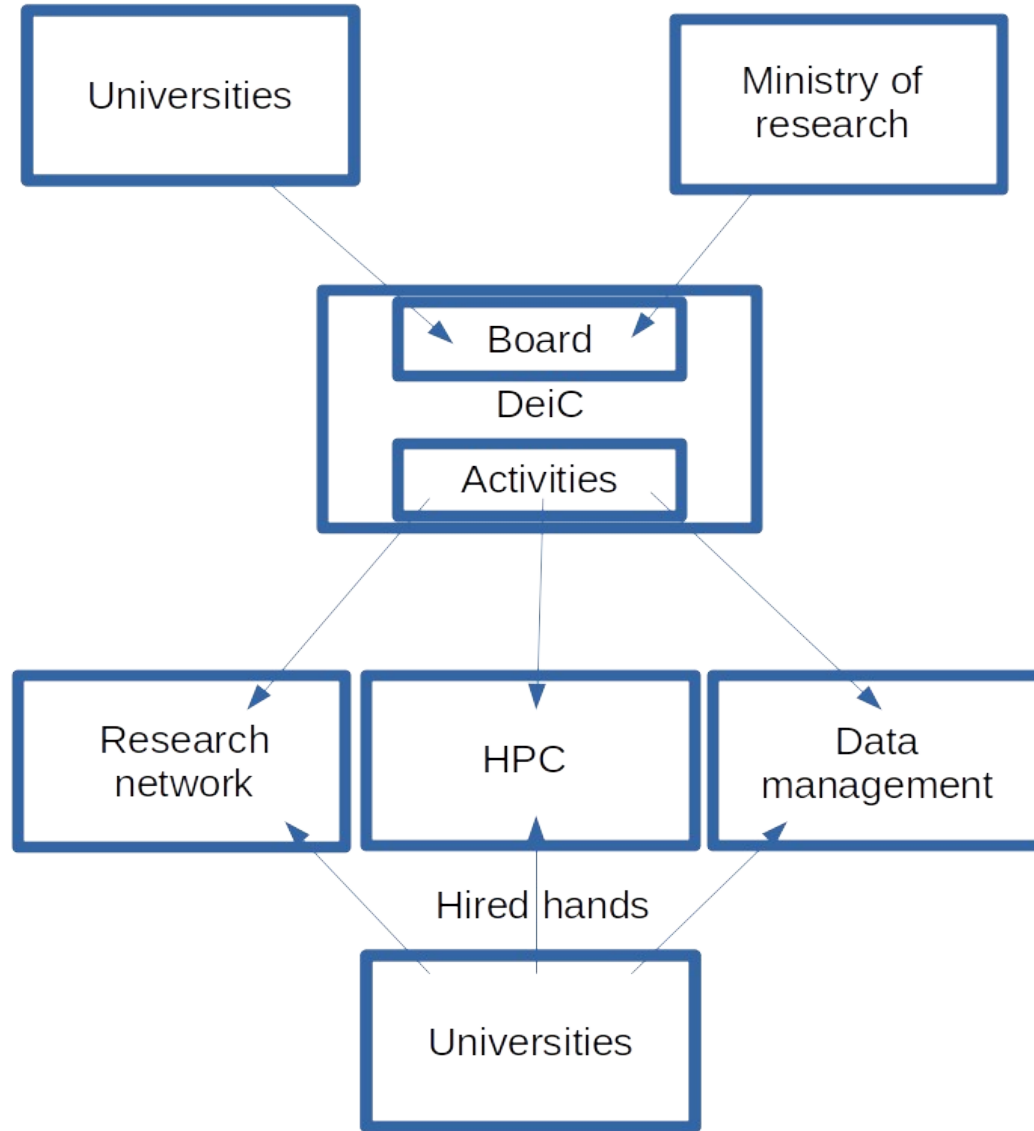


# **WDM usage at DeiC**

## **presented by Jan Ferré at CEF 2023**



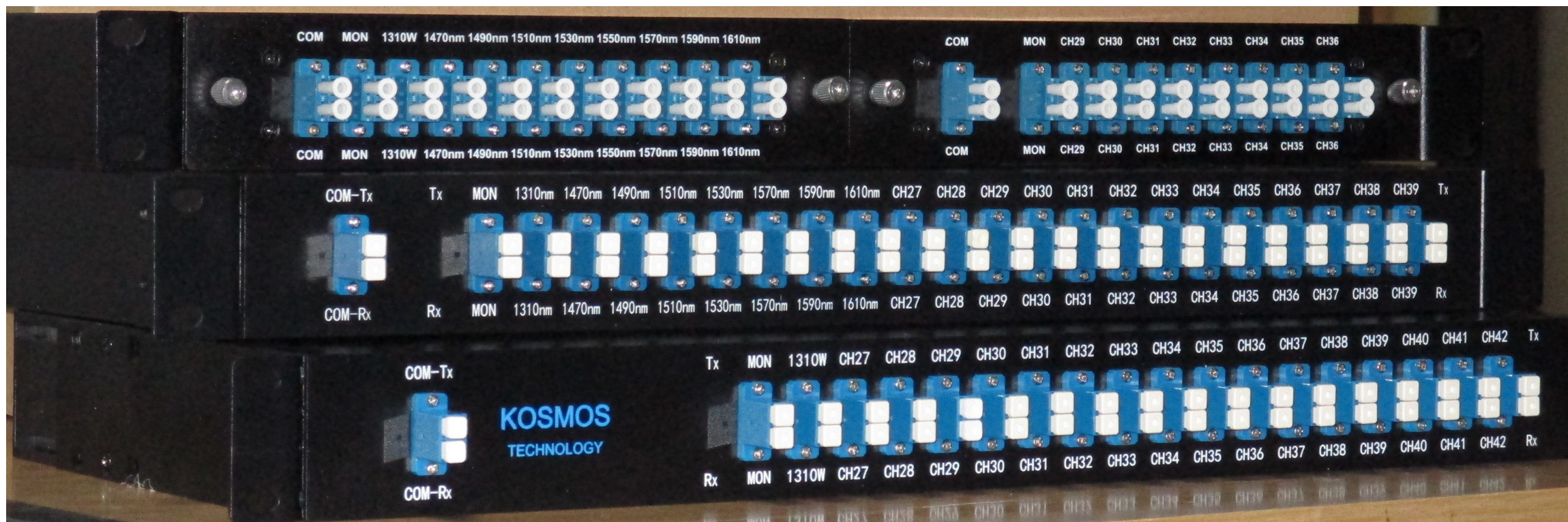
DeiC is an operator!

DeiC has no research obligations but strives to support danish universities and research institutions.

## **Forskningsnettet (Danish NREN)**

- Paid by users (keep it simple and cheap)
- Transport using wavelength (and VLAN)
- No MPLS
- Delivers IP infrastructure and private transport for universities and research based public institutions.

# WDM: CWDM - XWDM - DWDM

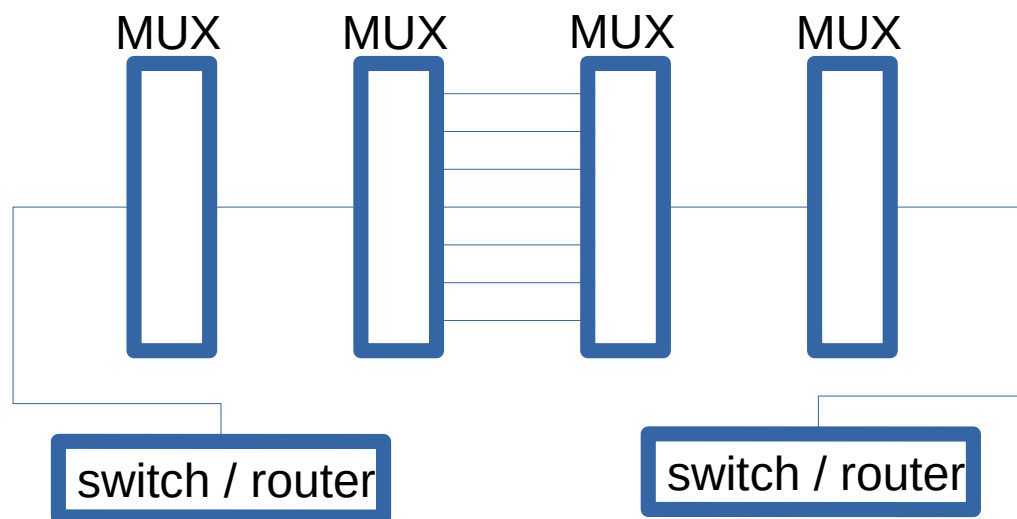


Always: 1310 Wide, Monitor

## **Optics**

- 10 Gbps or 100 Gbps
- 10 Gbps as LR or WDM 80 km
- 100 Gbps as CWDM4, LR4, ER4, ZR4 (or Coherent)
  
- WDM optics are fixed wavelength except for Ribbon system

## Simple all-passive optical transport

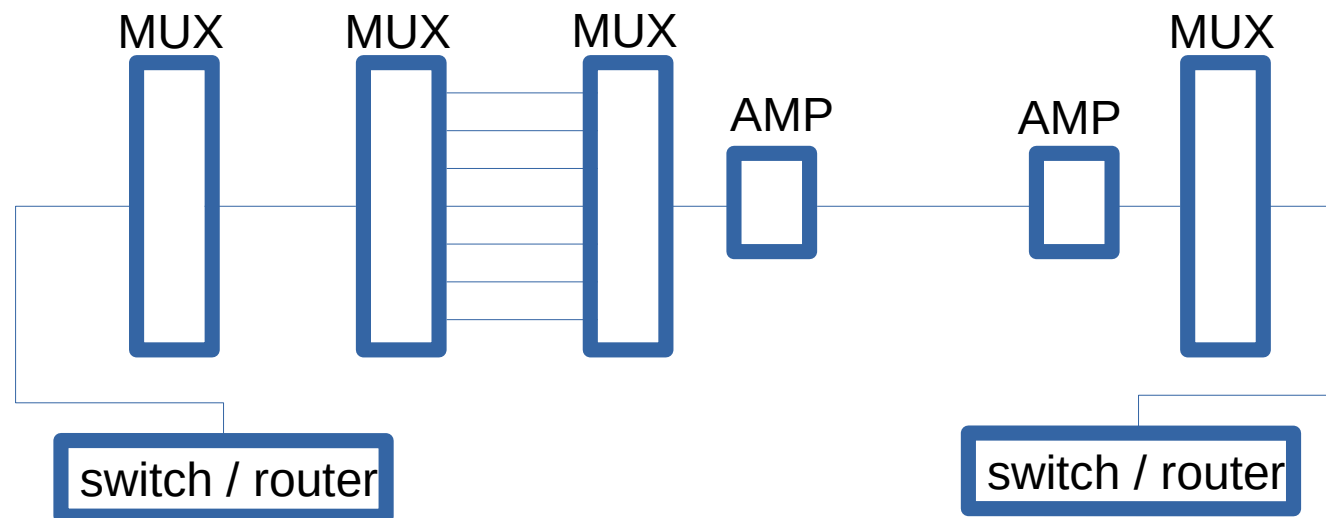


One link: mux – line – mux will cost about 5 dB

With 80 km optics (24 dB range) you will safely have 3 links – 4 links may be possible

CWDM 1550 nm or DWDM Ch34 is reserved for OTDR

## Simple amplified optical transport



## Simple amplified optical transport

When using amplifiers do consider:

- Works at C-band – close to 1550 nm
  - With CWDM: only 1550 nm can be amplified
  - With XWDM: Use CWDM to pick out DWDM channels. Use center channels only
- Calculate the total powerlevel – do you want preamp, booster or both?
  - 1 wavelength 0 dB, 2 wavelengths 3 dB, 4 wavelengths 6 dB, 8 wavelengths 9 dB, 16 wavelengths 12 dB
- Wavelengths should be (approximately) equal powerlevel



## **Active NMS-based optical transport**

Countrywide ECI (Ribbon) NMS-based transport system

- 25 locations / 60 shelves/directions
- ROADM based
- Transponder based (1 Gbps, 10 Gbps, 100 Gbps)
- Few Alian wavelengths (supporting NORDUnet) at 100 Gbps and 200 Gbps
- 100 Gbps using coherent optics