

Centre National pour la Recherche  
Scientifique et Technique

# MARWAN

## Moroccan NREN

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# Organization

MARWAN Department



CNRST

Research Funding :

- Call of Projects

Resource Sharing :

- UATRS : Sharing of heavy equipment's (Chemistry/Biology/Materials Science)
- IMIST : Access to Technical & Scientific Information
- **MARWAN** : e-Infrastructures & e-Services

# Mission

## E-Infrastructures :

- **MARWAN NREN**
- HPC (MAGRID / MAGRID CA)
- Cloud for Research & Higher Education



202?



## E-Services :

- Roaming Wifi : EduRoam
- Identity Federation : EduldM
- Digital Certificates : TCS
- EduVPN
- SOC for Research & Higher Education



202?



# MARWAN NREN

- Start : 1998
- Funded by the Ministry of Higher Education & CNRST &  
Universities
- All education and research institutions can be connected to

MARWAN

# Objectives

- Provide connectivity to Moroccan universities
- Offer federated services
- Increase exchanges between universities
- Connect to regional network to facilitate universities participation in international scientific collaborations
- Reduce the global cost of the connectivity

# Evolution

1998

- **MARWAN**
- Backbone : Copper Leased Lines / ONPT / Access : 64 – 512 Kbps
- Funding : Ministry of Higher Education + Universities

2005

- **MARWAN 2**
- Backbone : FO VPLS-L3 / Maroc Telecom / Access : 2 – 34 Mbps
- Funding : CNRST + Universities

2010

- **MARWAN 3**
- Backbone : FO VPLS-L3 / Meditel / Access : 34 – 100 Mbps
- Funding : CNRST + Universities

2017

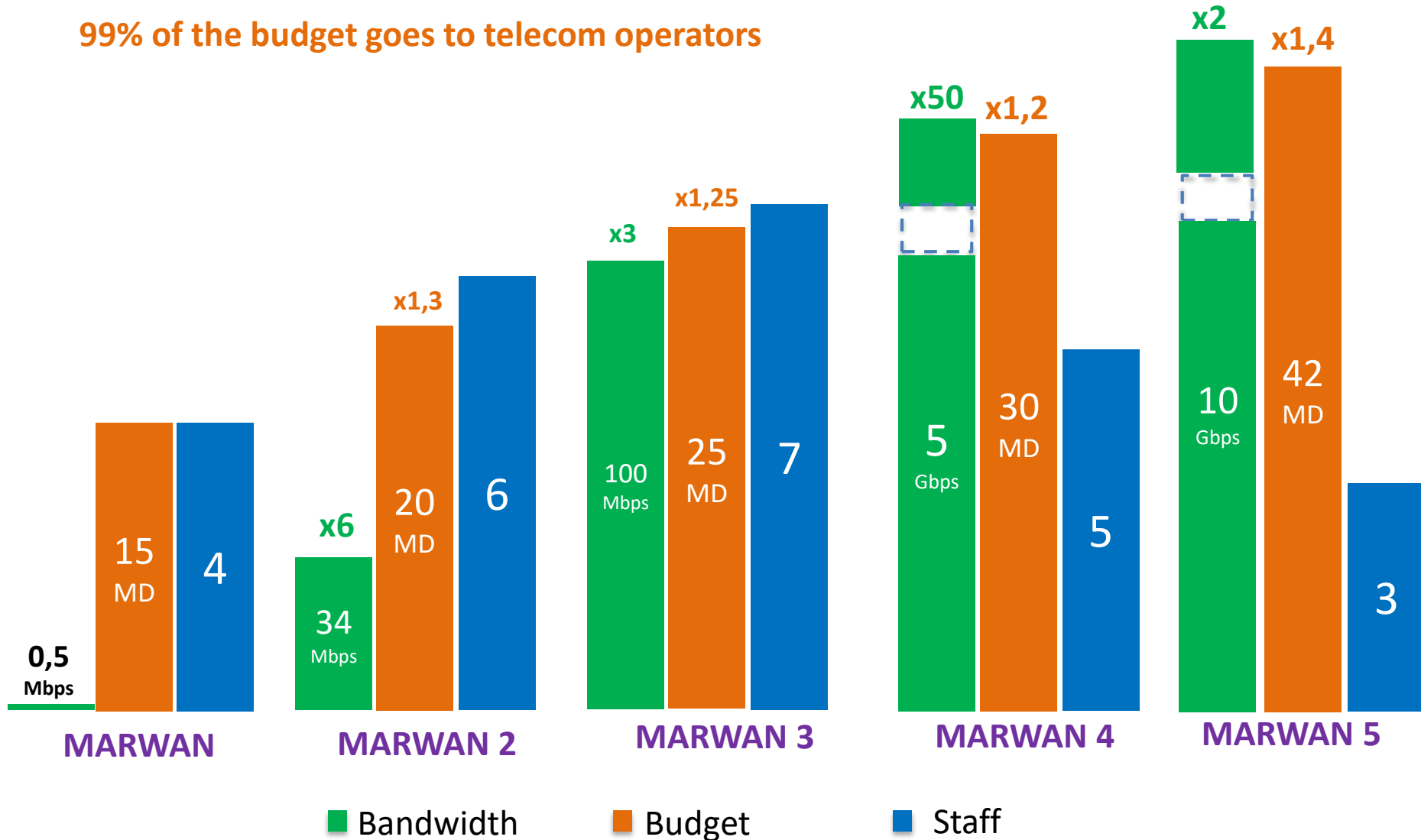
- **MARWAN 4**
- Backbone : FO VPLS-L2/ INWI / Access : 100 Mbps – 5 Gbps
- Funding : Ministry of Higher Education

2022

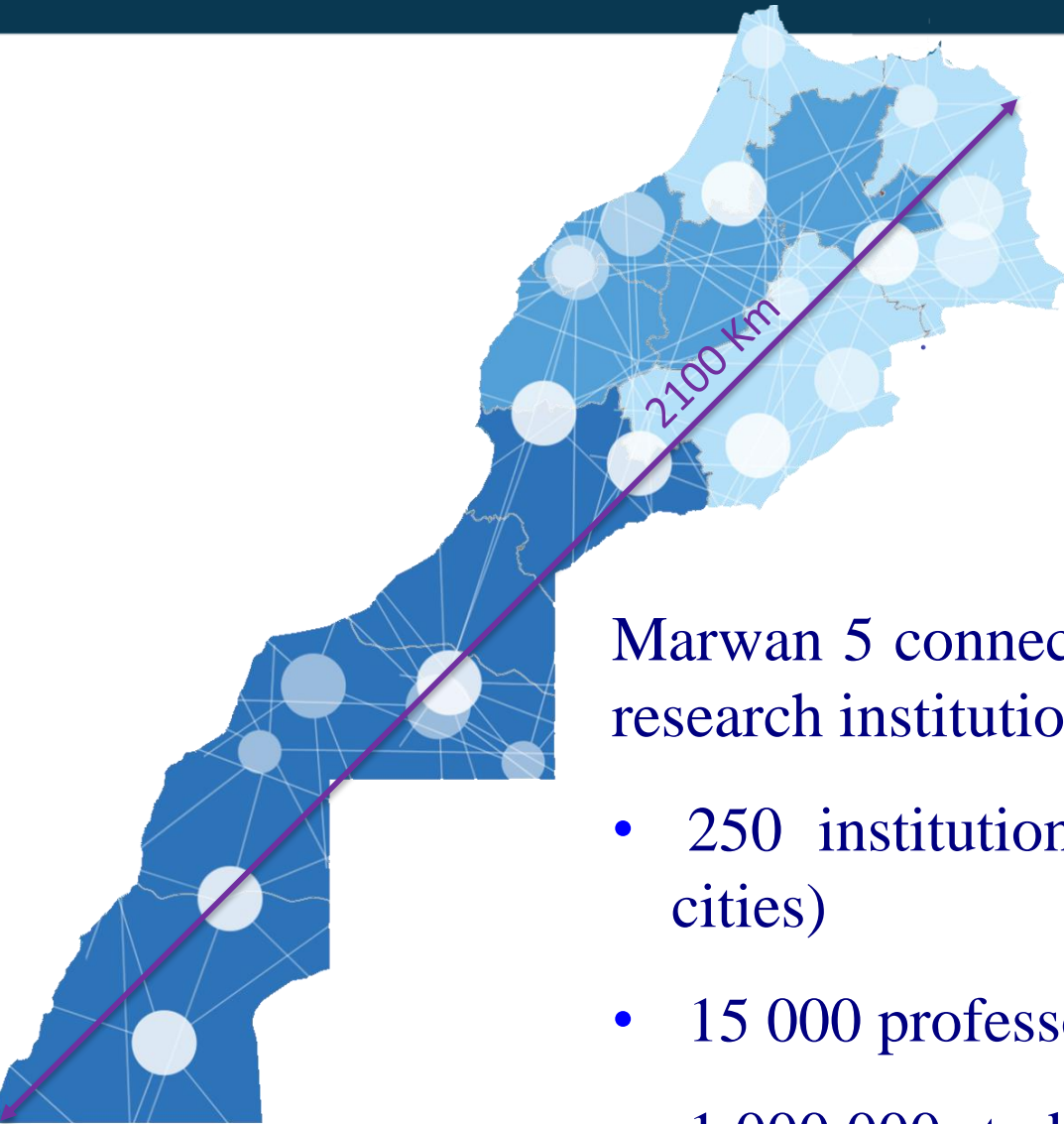
- **MARWAN 5**
- Backbone : FO SD-WAN/VPLS-L3/ INWI / Access : 100 Mbps – 10 Gbps
- Funding : FSU + (CNRST : GEANT)

# Ressources

99% of the budget goes to telecom operators



# Coverage

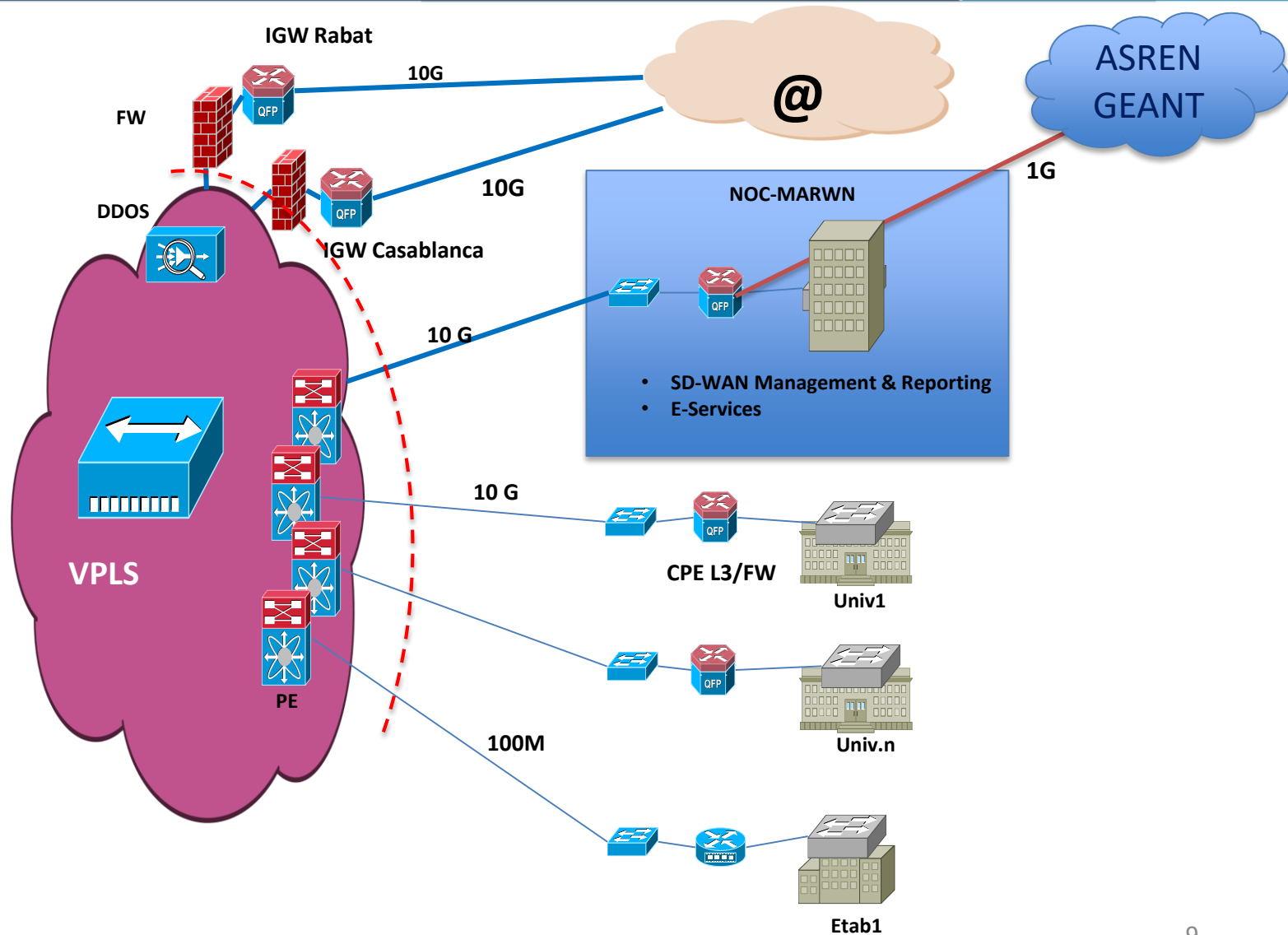


Marwan 5 connects all the higher education and research institutions in Morocco :

- 250 institutions connected (138 links / 51 cities)
- 15 000 professors and researchers
- 1 000 000 students



# MARWAN 5



# SD-WAN ?

- Enable Universities :
  - To have more Internet capacity at a lower cost N x FTTH
  - Diversify connectivity (Failover)
  - Maintain IP visibility even when switching to the backup link

# MARWAN 4 vs 5

MARWAN 4	MARWAN 5
VPLS/L2	VPLS/L3
WAN	SD-WAN
Access 100 Mbps to 5 Gbps	Access 100 Mbps to 10 Gbps
Bandwidth Increase : 0%	Increase : 50% 2023 – 50% 2024
Internet Breakout : No	Internet Breakout : Oui
Internet : 2 x 10 Gbps	Internet 2 x 10 Gbps (20% increase if usage > 80% working hours)
GEANT : VPN / 1Gbps	GEANT : Physical / 1 Gbps
Links : 91	Links : 138
Total access : 36 Gbps	Total access : 46 Gbps
Filtrring : No	Filtrring : No

# Cost

MARWAN 5			MARWAN 4	
Bandwith (Mbps) <sup>2</sup>	Cost/Month (DH/HT)	Activation Fees (DH/HT)*	Cost/Month (DH/HT)	M4/M5
100	5 599	132 768	17 800	3,18
200	7 270	132 768	21 360	2,94
300	8 869	132 768	24 920	2,81
400	9 787	132 768	28 480	2,91
500	12 000	168 993	32 040	2,67
600	14 199	168 993		
750	15 600	168 993	42 720	2,74
800	16 650	168 993		
1000	19 200	168 993	53 400	2,78
2000	23 499	168 993	69 420	2,95
3000	29 398	168 993	85 440	2,91
4000	36 395	168 993	101 460	2,79
5000	45 000	463 491	117 480	2,61
10000	75 000	463 491		

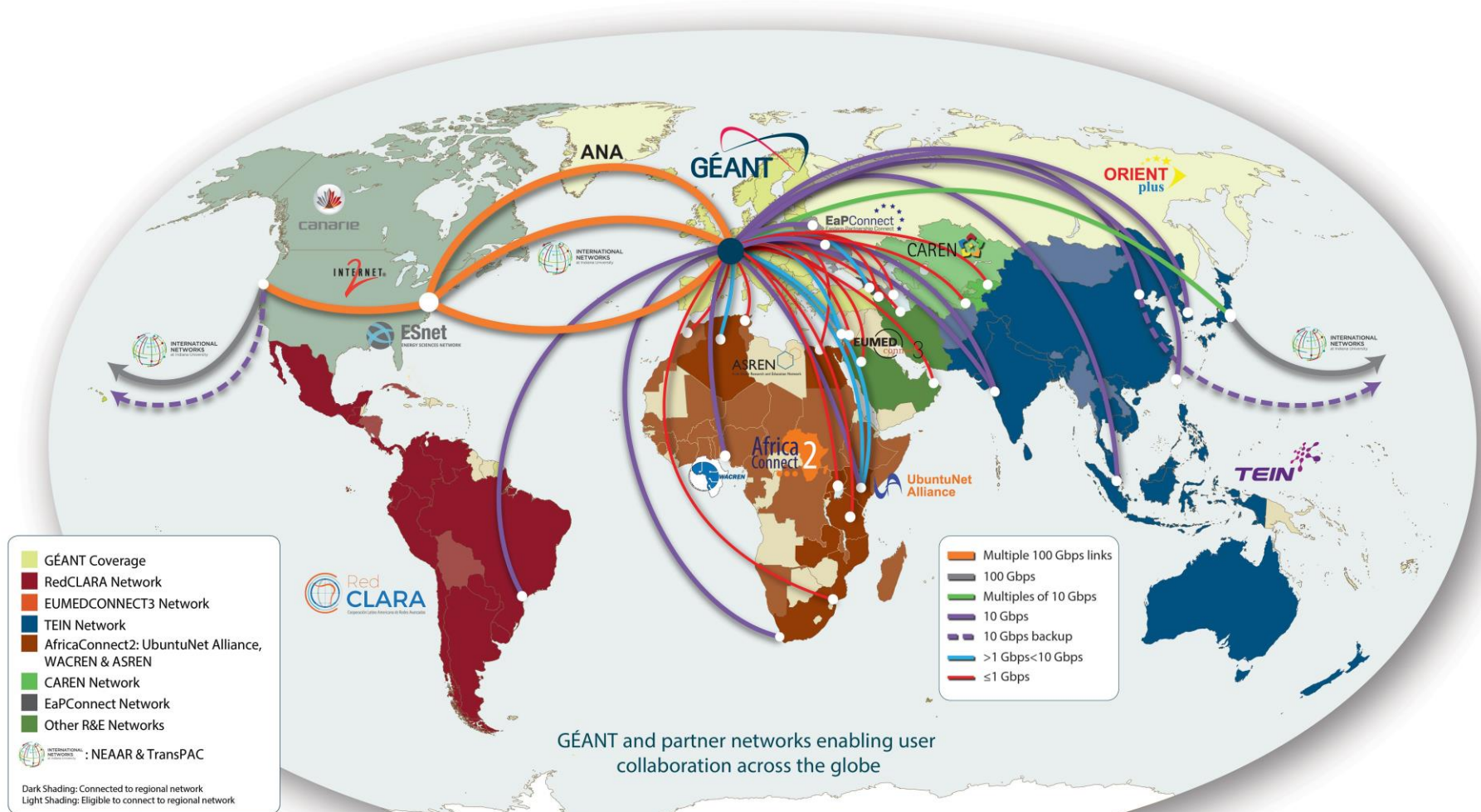
(\*) : In the case where the contract is established for a period of more than 2 years, there is no activation fees.



# GEANT Connectivity



At the Heart of Global Research and Education Networking

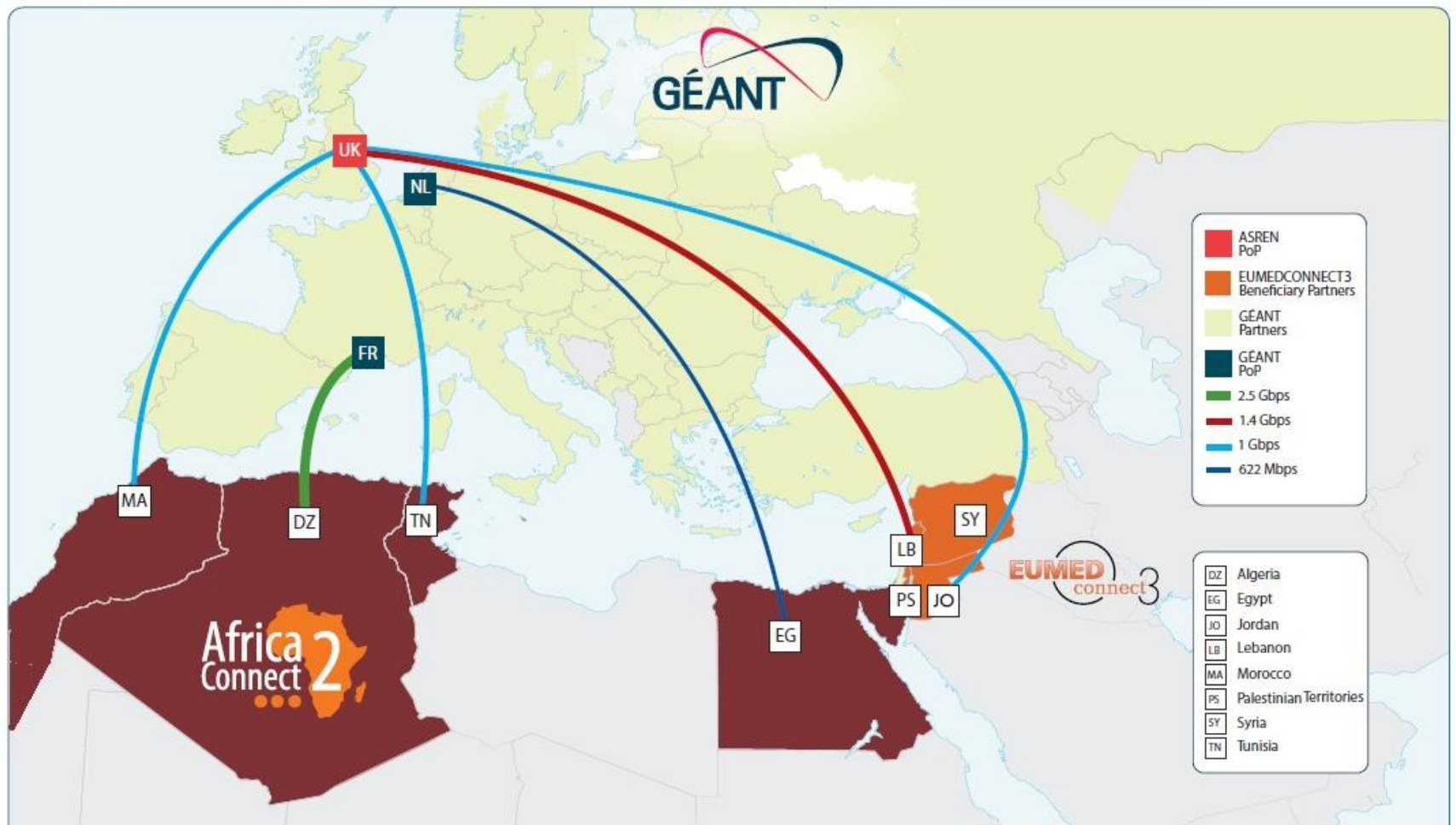


GEANT and partner networks enabling user collaboration across the globe

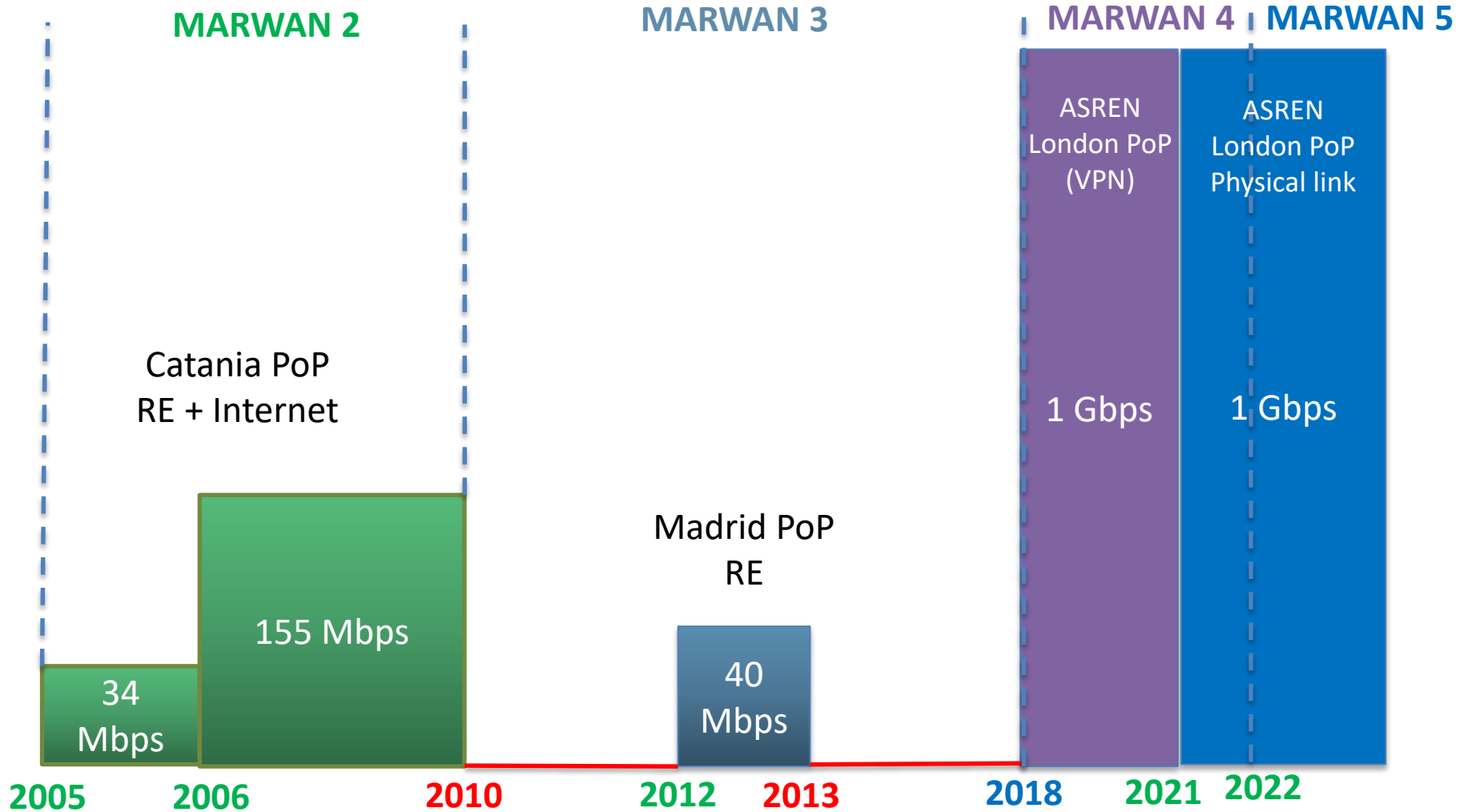
# GEANT Connectivity



The Research and Education Network for the Eastern Mediterranean



# GEANT Connectivity





# Services

- Connectivity :
  - High Bandwidth Access (100 Mbps – 100 Gbps)
  - Internet Access : 2 x 10 Gbps
  - GEANT : 1 Gbps
  - IPv6, QoS & Multicast
  - Caches : Google / Facebook
  - Software Repositories (Mirroring)
  - DNS I-Root

# Services

- e-Services :
  - EduRoam
  - Identity Federation (EduGain)
  - Trusted Certificate Service (TCS)
  - EduVPN

## EduRoam

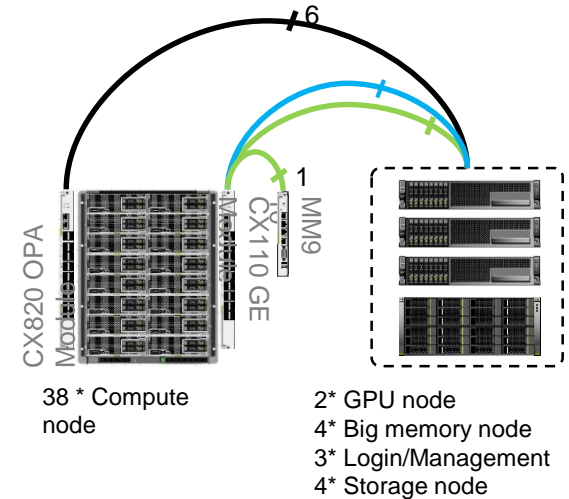
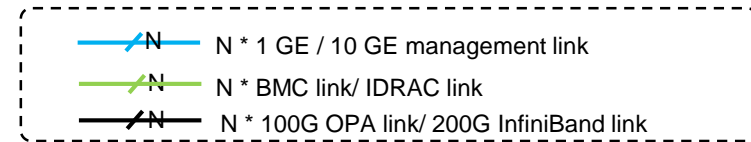


## EduGain



# Services

- High Performance Calculation (HPC)
  - MaGrid (2005)
  - MaGrid CA (EugridPMA)
  - New Datacenter & HPC Cluster (2018):
    - 1672 Cores (122 Tflops)
    - 10,4 TB Memory
    - 102 TB Storage
    - 100/200 Gbps Low latency network (OPA & InfiniBand)



# Challenges/Constraints

- Governance / Strategy :
  - Marwan is not a legal entity
  - Completely dependent on the CNRST and Ministry strategy
- Budget :
  - Source of funding
  - Limited budget
- Human Resources :
  - Difficult to recruit
  - Difficult to retain
- Universities usage :
  - Low usage of the services offered by Marwan
  - Internet access is the main preoccupation for Universities
- Telecom Environment :
  - No Infrastructure Operators only Telecom Operators

# Usage Level

- Connectivity :

- High bandwidth access



- Internet Access



- Regional Connectivity



- IPv6, QoS & Multicast



- Breakout



- e-Services :

- EduRoam



- Identity Federation (EduGain)



- Trusted Certificate Service (TCS)



- EduVPN



- High Performance Calculation (HPC)



# Future Prospects

- Universities / Institutions :
  - Deploy the services:
    - Eduroam;
    - Identity Federation;
    - EduVPN;
    - Ipv6 / Multicast
  - More Resiliency:
    - Breakout
    - Ipv4/v6 & ASN allocation



<https://cnrst.ma>



**MARWAN**  
Moroccan NREN

<https://marwan.ma>

Thank you for your attention !