

# Türk Telekom

Değerli Hissettirir

**WORKSHOP**  
— ON —  
**SYNCHRONIZATION**  
— AND —  
**TIMING SYSTEMS**

# Türk Telekom

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## AGENDA

- **ABOUT TURK TELEKOM**
- TIME TRANSFER CHALLENGES FOR TELCO'S
- IDEAL TELCO SYNCHRONISATION EXPECTATION?
- PRECISION TIME NETWORK
- **OUR SYNC ROADMAP**





# Türk Telekom

ASSIST

innova

ARGELA

sebit

Türk Telekom  
International

## In Numbers

Over **180** years long History

**50.7M** Subscribers

**95% LTE** coverage in Turkey

**No. 1** Lead Operator in Turkey

**345.000 km** Fiber Deployment in Turkey

Over **30,000** Employees

**20** Country Presence with **~50,000 km** Fiber



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# The Telco Network

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WORKSHOP  
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# TIME TRANSFER CHALLENGES FOR TELCO'S

Telco Fixed Network consists of many various vendors and technologies.

DWDM, SDH, Radio Links, MPLS etc. (Nokia, Huawei, Cisco, Juniper, Ericsson etc.)

Current advised standard is 8275.1 and requires hardware/software upgrades

Not every hardware can support 8275.1

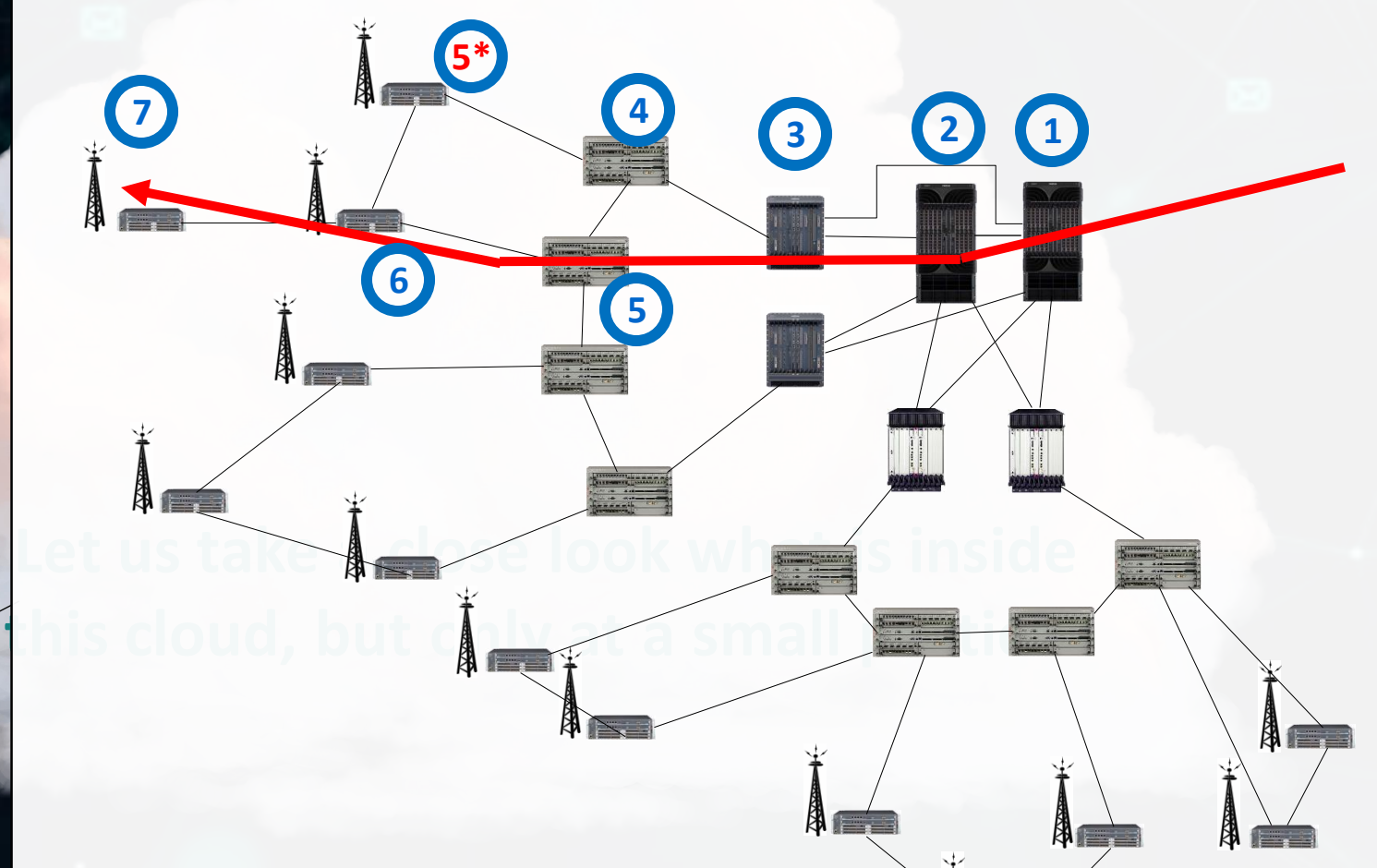
Even after full FTS 2-3 hop limit

Diverse Technologies and various Vendor troubleshooting is difficult

SLA is not possible, ie below a certain ns TE is not guaranteed

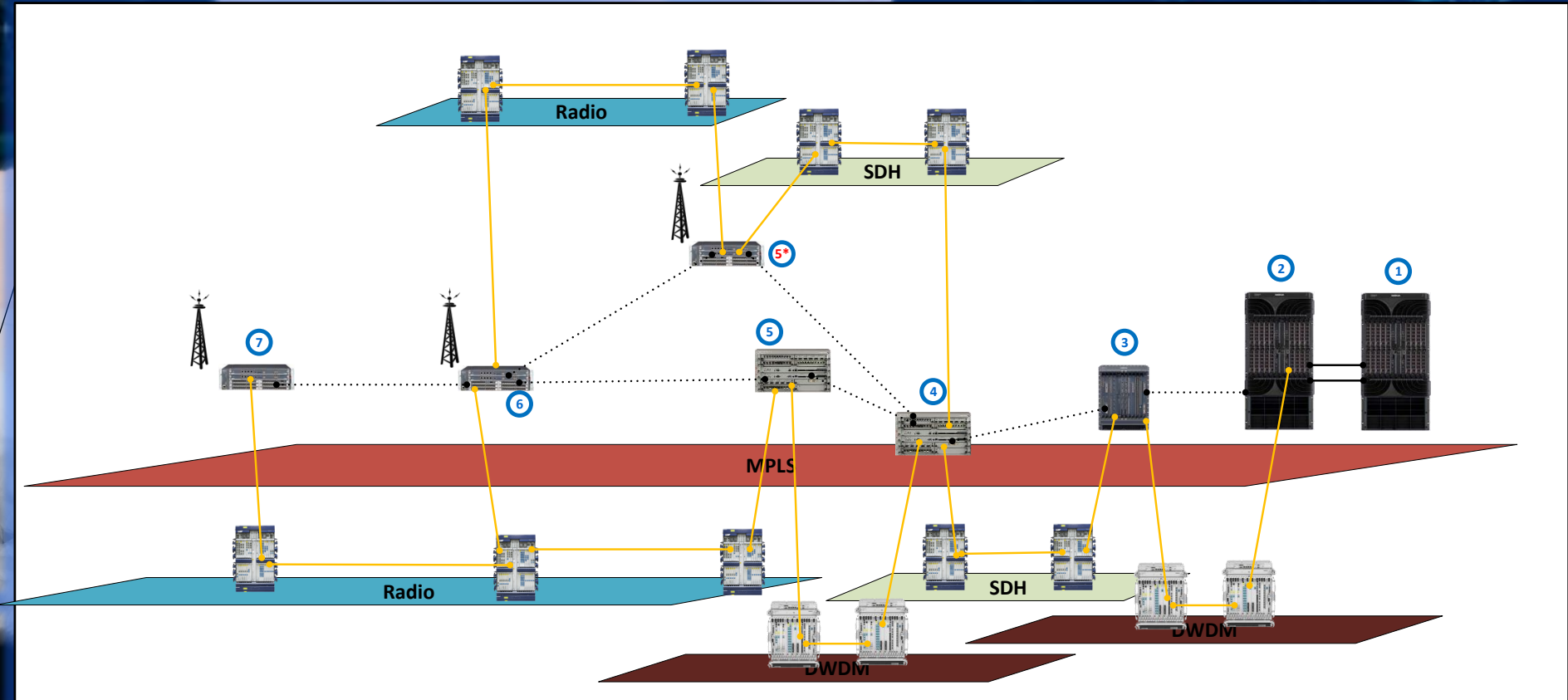


# TIME TRANSFER CHALLENGES FOR TELCO'S



This is only the MPLS layer

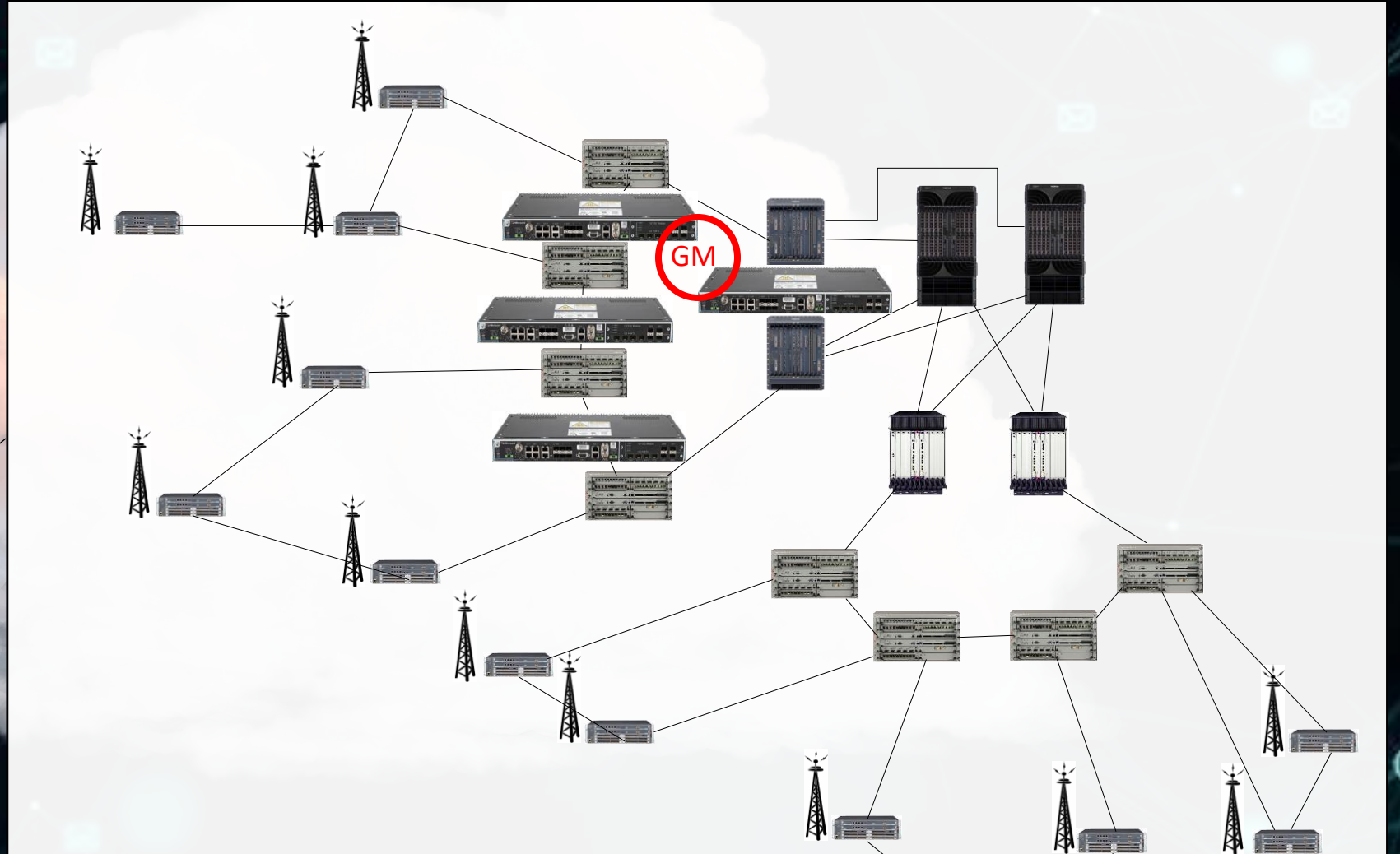
# TIME TRANSFER CHALLENGES FOR TELCO'S



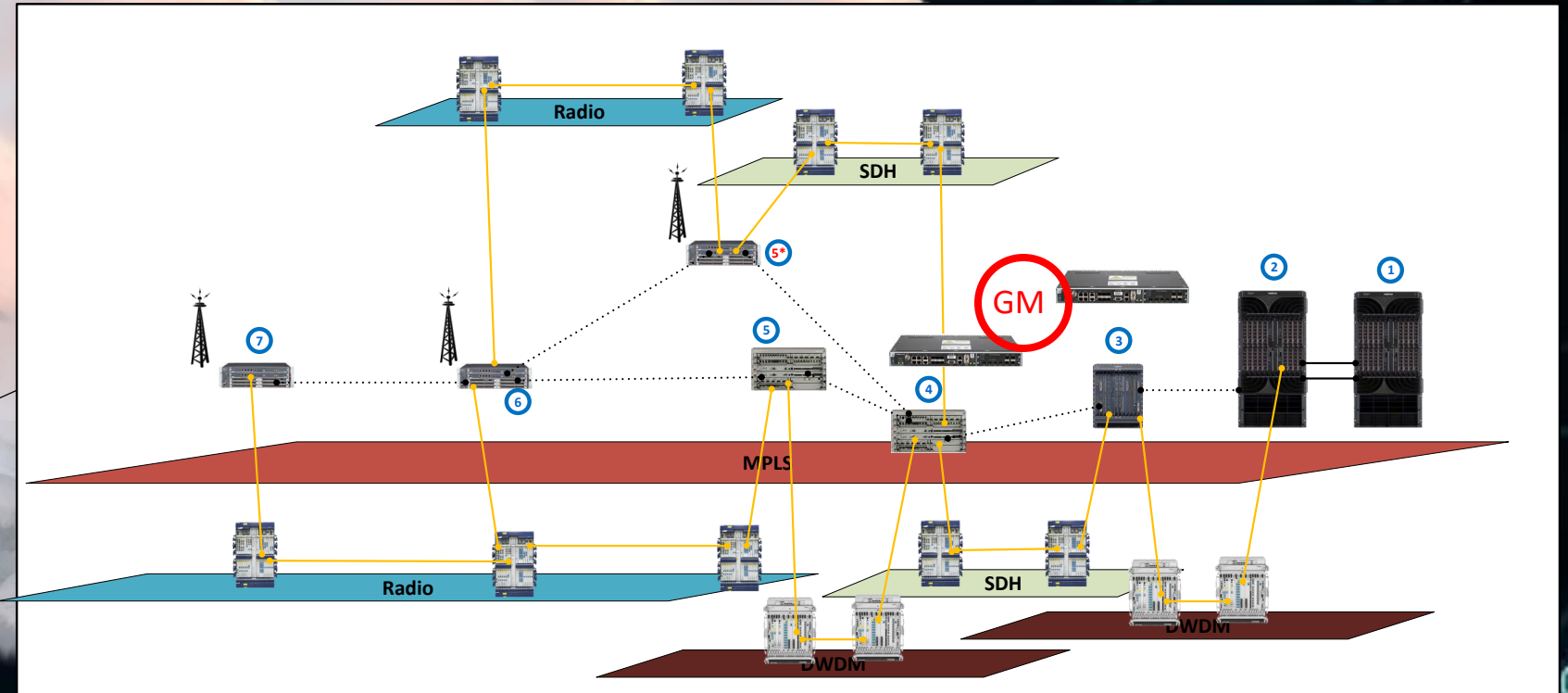
This is all layers. (MPLS, Radio, SDH, DWDM)



# TIME TRANSFER CHALLENGES FOR TELCO'S



# TIME TRANSFER CHALLENGES FOR TELCO'S

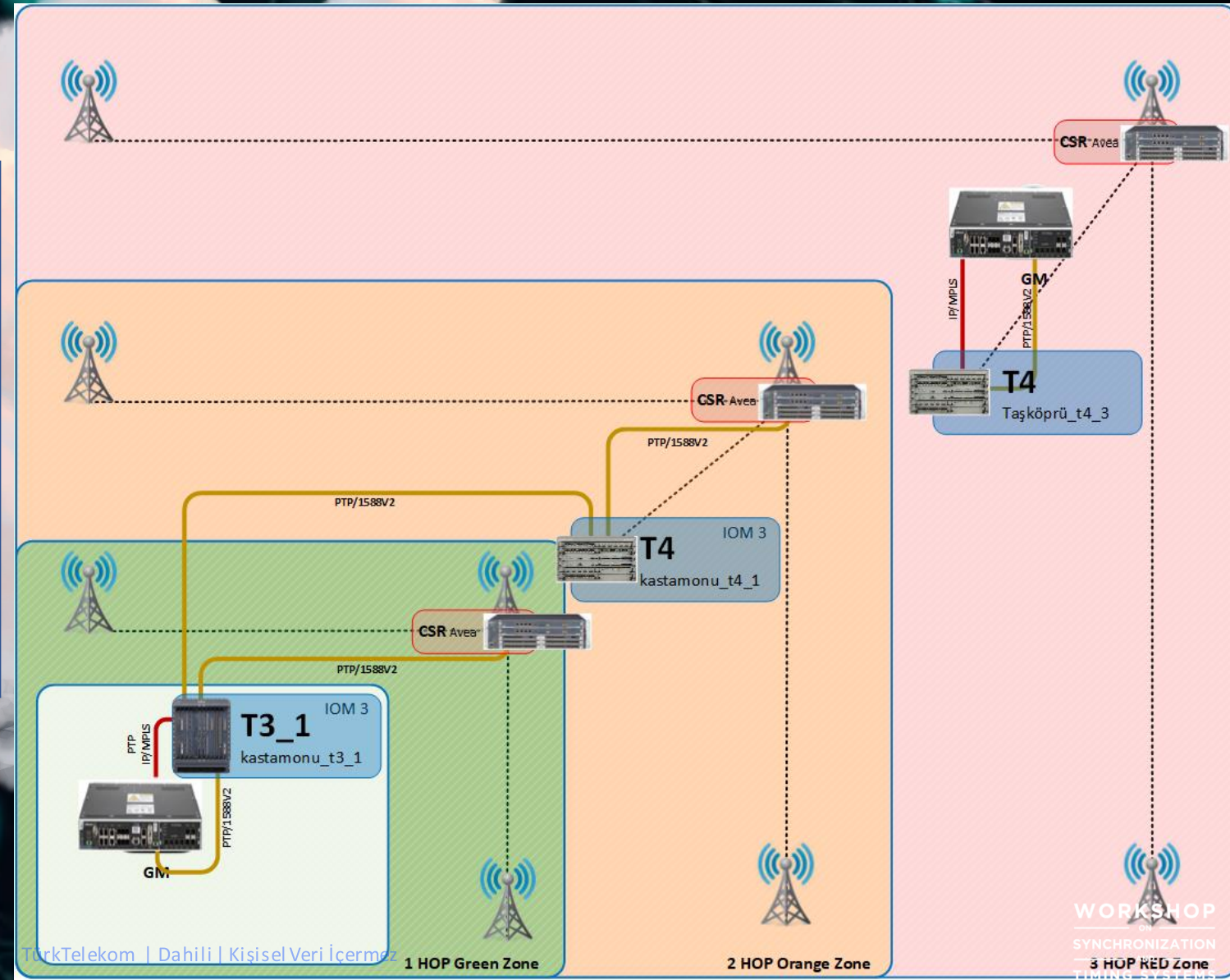


Strategically placing a **GM is critical**



# TIME TRANSFER CHALLENGES FOR TELCO'S

- GPS DEPENDENCY
- TROUBLESHOOTING
- OPERATIONAL CHALLENGES
- MONITORING
- SLA
- INVESMENT & ROI
- HARDWARE DEPENDENCY

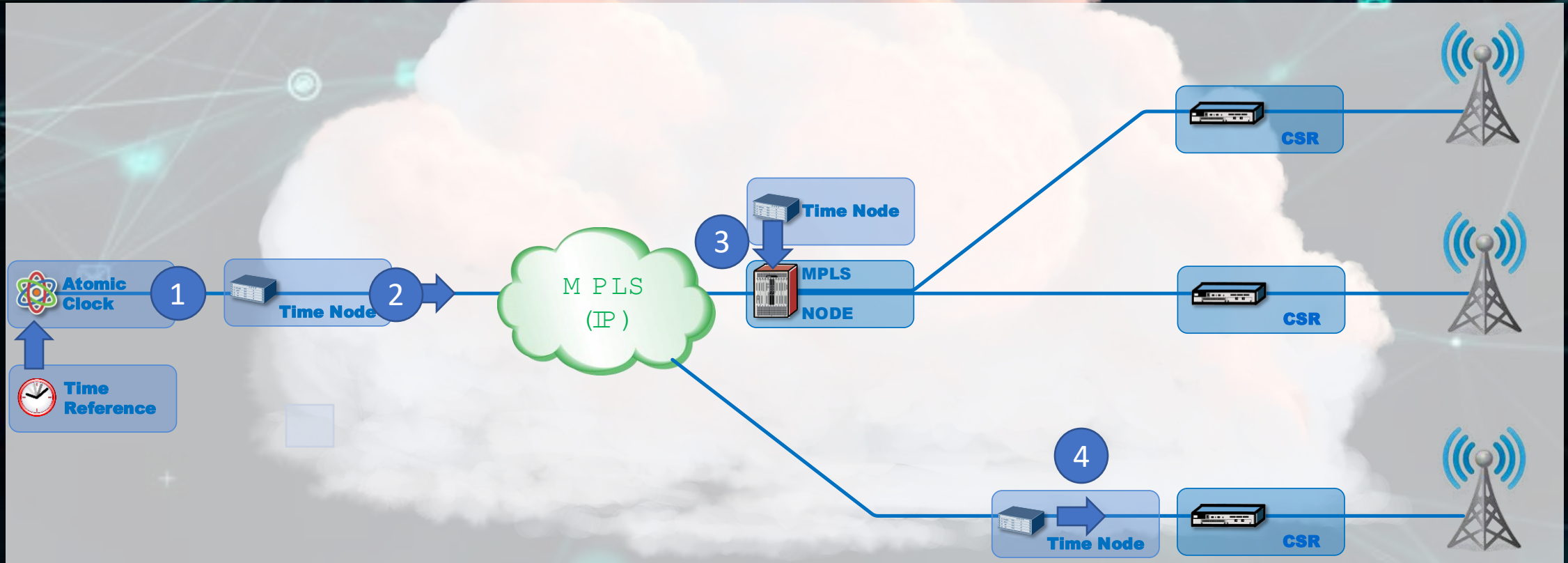


# IDEAL TELCO SYNCHRONISATION EXPECTATION?

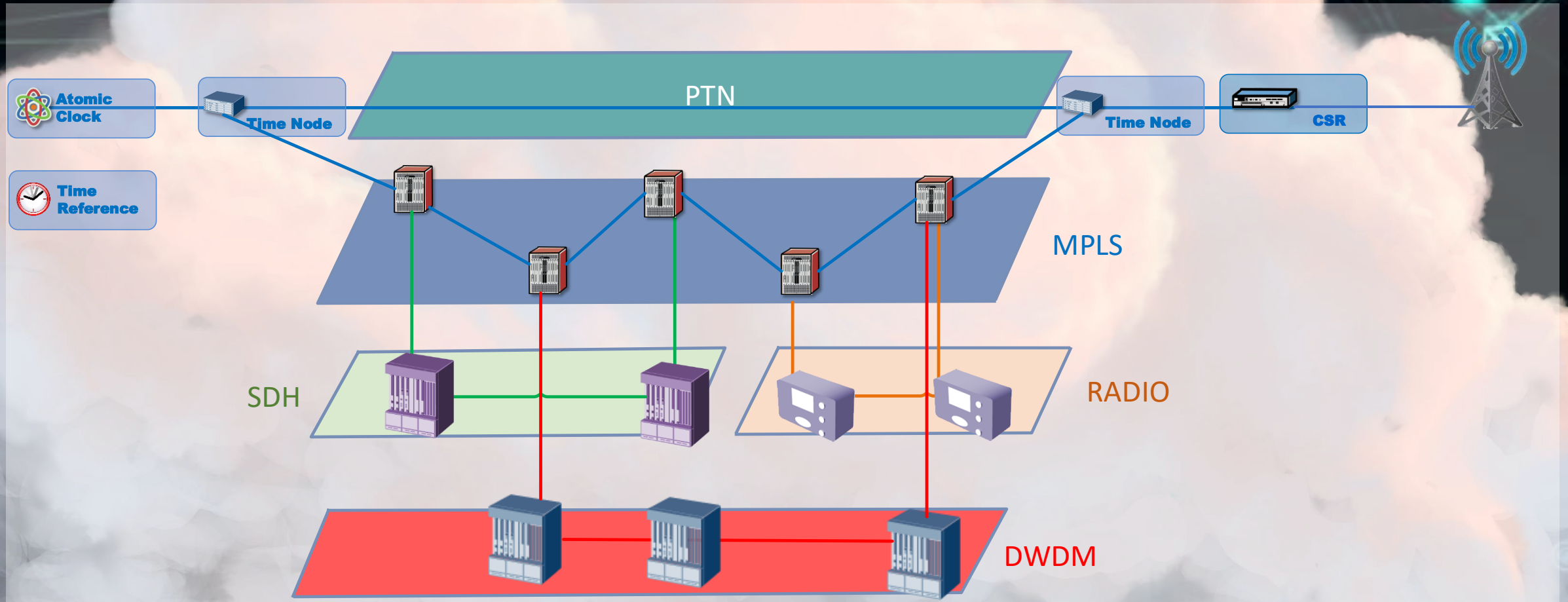
- **MUST HAVE GPS INDEPENDENCY**
  - Not be affected by jamming or spoofing. (National security issue)
- **PLUG AND PLAY**
  - No dependency on FTS or hardware/software
- **TROUBLESHOOTING**
  - Must be easy to troubleshoot and monitor
- **OPERATIONAL CHALLENGES**
  - One responsible entity for synchronisation and its operations
- **MONITORING**
  - End to end 24/7 monitoring of TE
- **SLA**
  - Providing SLA will allow to sell Time as a Service
- **INVESTMENT & ROI**
  - Investment must be minimal and can be planned which results to a better ROI
- **HARDWARE/SOFTWARE INDEPENDENCY**
  - No FTS requirement



# PRECISION TIME NETWORK



# PRECISION TIME NETWORK

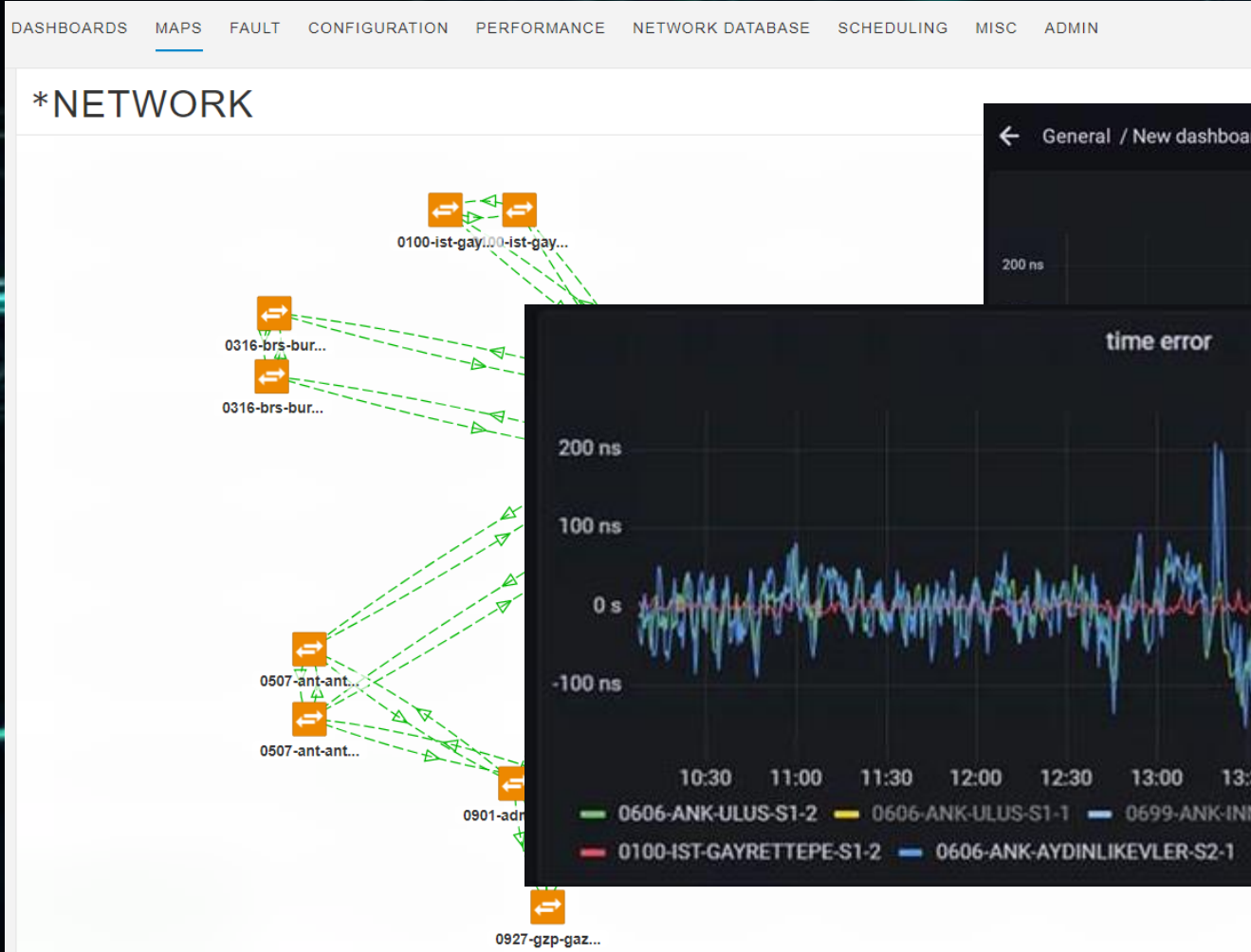




# TURK TELEKOM SYNC NETWORK (PTN)

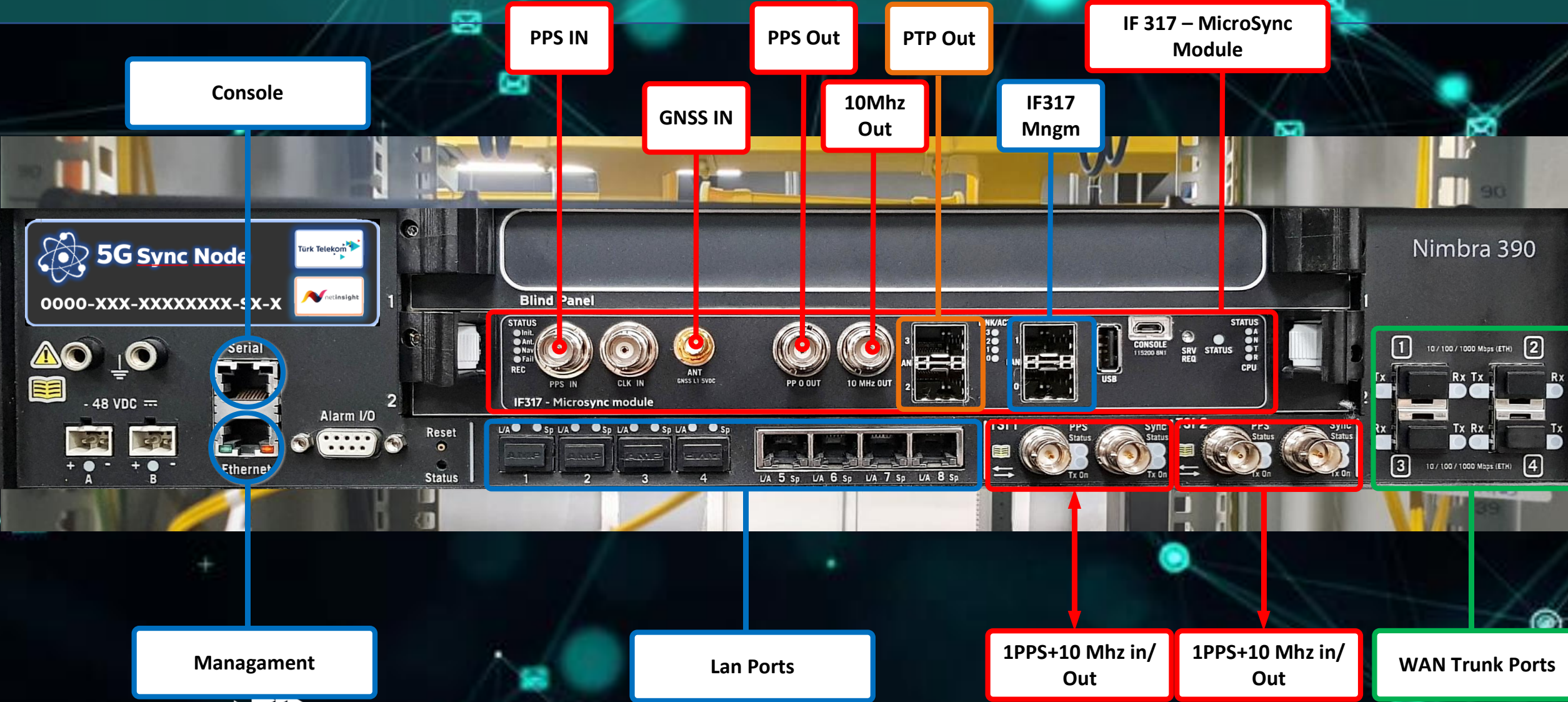
- SYNCHRONISATION NETWORK DESIGN IS FINALIZED
- CORE SYNCRONIZATION NODE'S INSTALLED
- SYNC NETWORK ROLOUT HAS BEEN HARMONIZED WITH 5G ROLLOUT KISA VADE STRATEJİ
- 5G and DSS LOCATION IS BEING ADDED TO THE ROLLOUT
- LONG/MID TERM TERM GOAL
  - EVERY 5G LOCATION TO BE GPS/GNSS INDEPENDENT AND WORKING ON A CENTRALIZED TIME REFERENCE.
  - A TaaS or TSaaS IS PROVIDED TO OTHER OPERATORS OR OTHER INDUSTRIES IE FINANCE, ENERGY, MILITARY.

# PRECISION TIME NETWORK

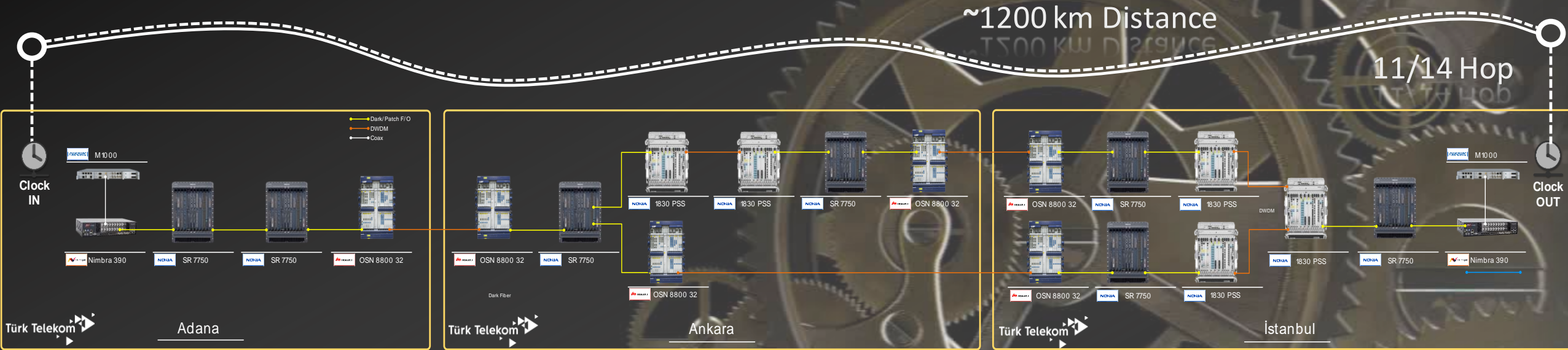




# PRECISION TIME NETWORK



# PRECISION TIME NETWORK



## PTN Over MPLS and Transmission



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## Thank You



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