Business Models and Scaling Up Successes

Maintaining Interoperability By Open-Standards Design in The Power Distribution For Smarter Grid

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Grid-Interop
Driving to Grid 2020

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- Overview of the Electricity Network in Al Ain Area
- The Digital Grid; Overview of The DMS System
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Target of the paper

The Role of Open Standard and Interoperability For Smarter Distribution Management System

Overview of the electricity network in Al Ain Area…1

- Area of about 13,000 km^2.
- Total no. of consumers > 106,000 and maximum load (2010) of 1799 MW and energy consumption of 7950.88GWh
- Expected load by 2014 is 2869 MW (55% up) with energy consumption of 13520.236 GWh and expected number of over than 170,000 consumers

Overview of the electricity network in Al Ain Area…2

- From the transmission (400/220kV) to the distribution (33/11/0.415) kV
- Type of substations:
  - Primary substations 33/11kV
  - Secondary distribution substations 11/0.415kV

Overview of the electricity network in Al Ain Area…3

- Type of substations:
  1. Primary distribution
     - Firm capacity 30 to 60 MVA
     - No. of switchgears: 10 of 33 kV & 24 of 11kV or 3 of 33 kV & 5 of 11kV

Brick Built
1980's & 1990's

Package Unit
>2000

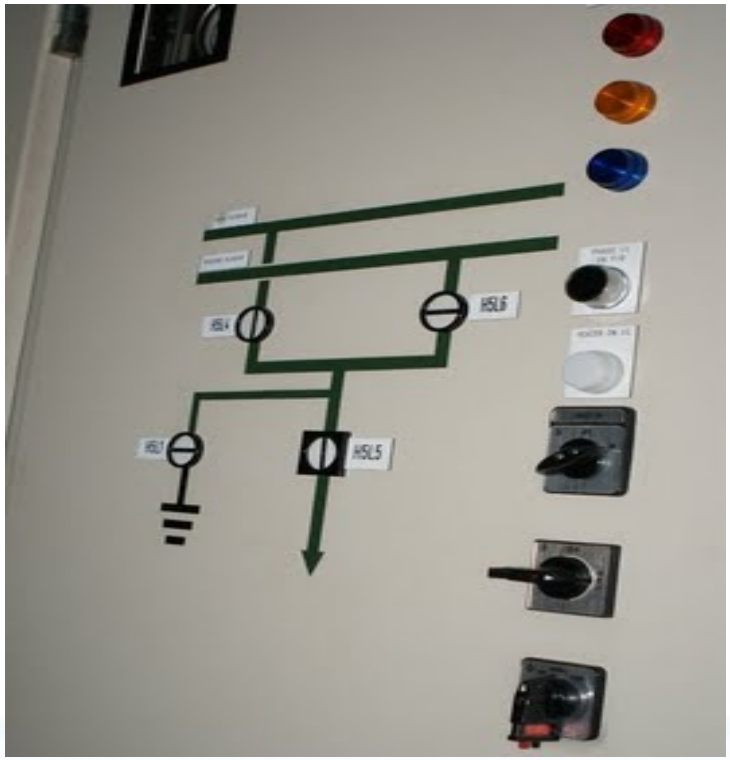
Overview of the electricity network in Al Ain Area…4

- Type of substations:
    1. Secondary distribution
        - Firm capacity 1MVA to 3 MVA
        - No. of switchgears: 2+1 (RMU) to 2+2 (Brick Built)

Old Distribution Substation Case Study

Substation Control Points before IT integration

- Local Control Point
- Substation Control Point



Old distribution substation case study

Adaptation of IT in Existing Substations

& Integration to DMS

- Remote terminal unit (RTU), a MP based system built in a modular system
  - The RTU monitors and controls the substation
  - Periodic measurement, acquisition of events, stamping all events by 1 ms resolution time, and communicate to IED's
- Data exchange through wireless media (GSM/GPRS) or pilot cables along with power cables (33kV)

Photo for Selta RTU, Italy

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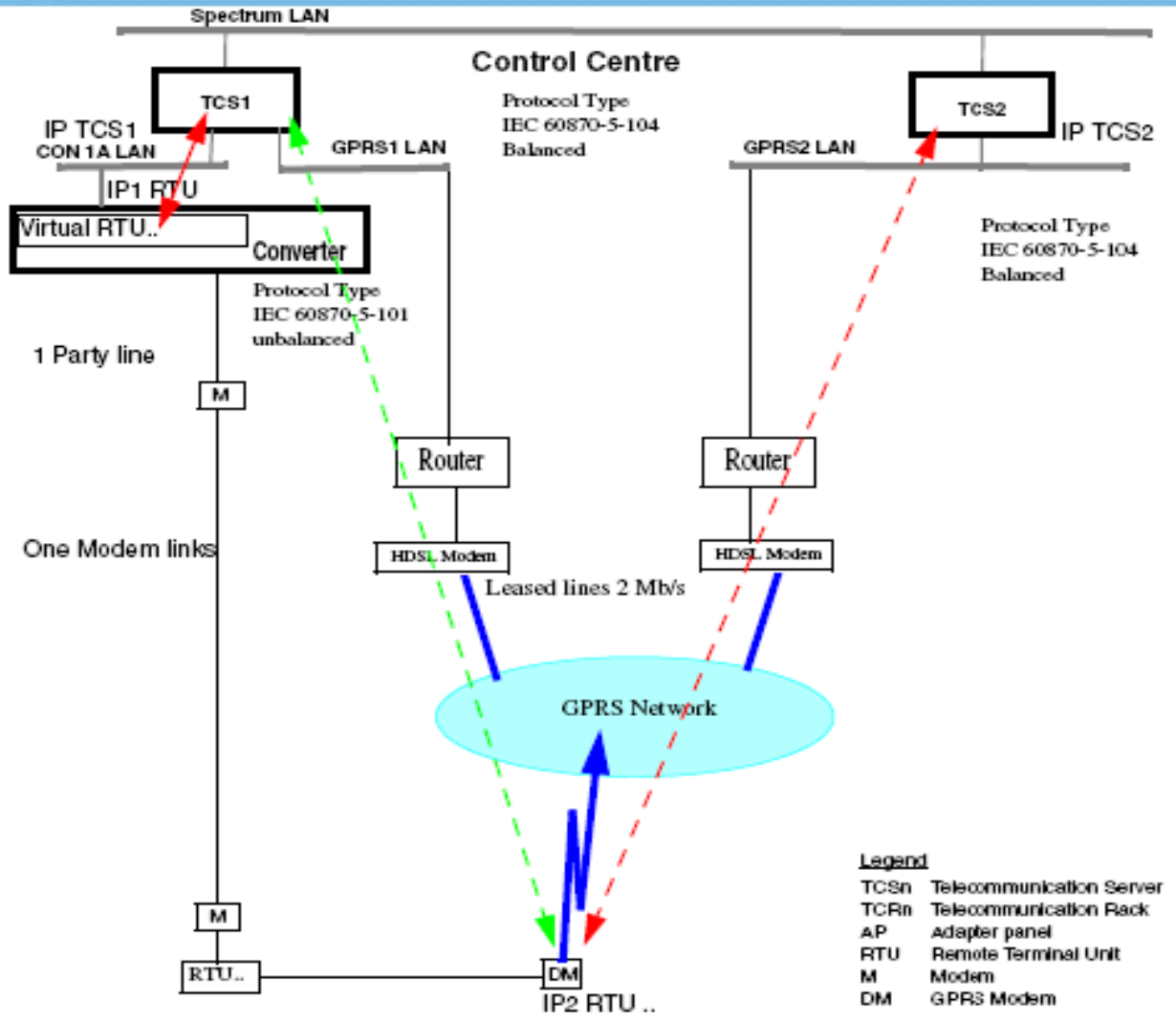
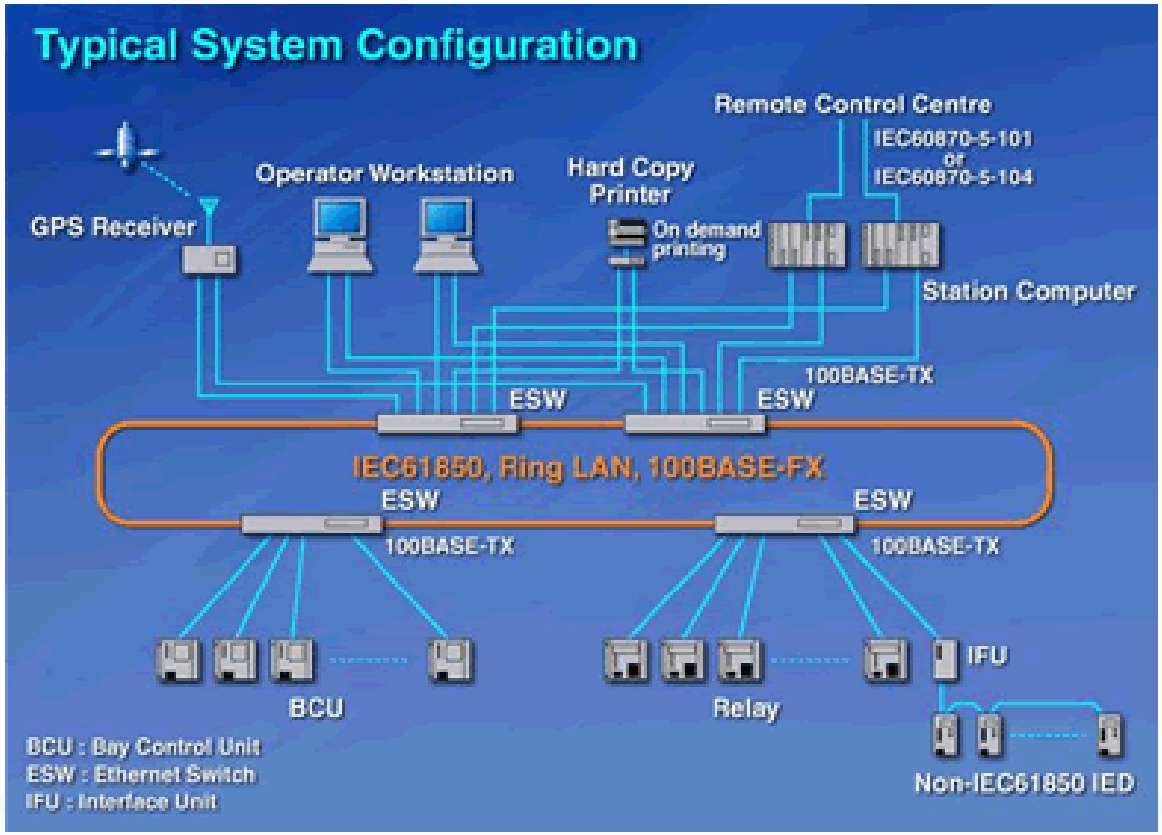
Communication to DMS, GPRS & Copper Wires



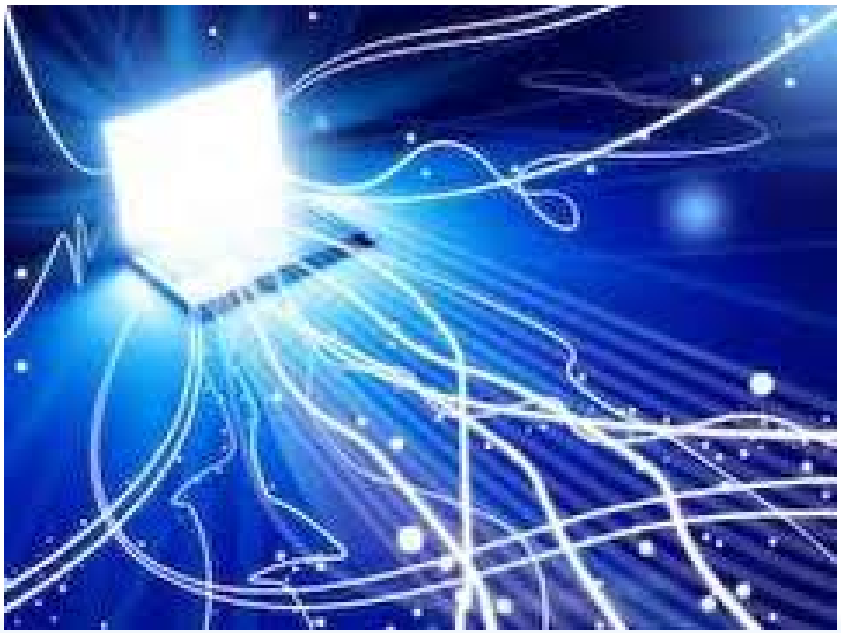
New substation case study

- SCMS system was adapted
- Easy to upgrade; software and hardware

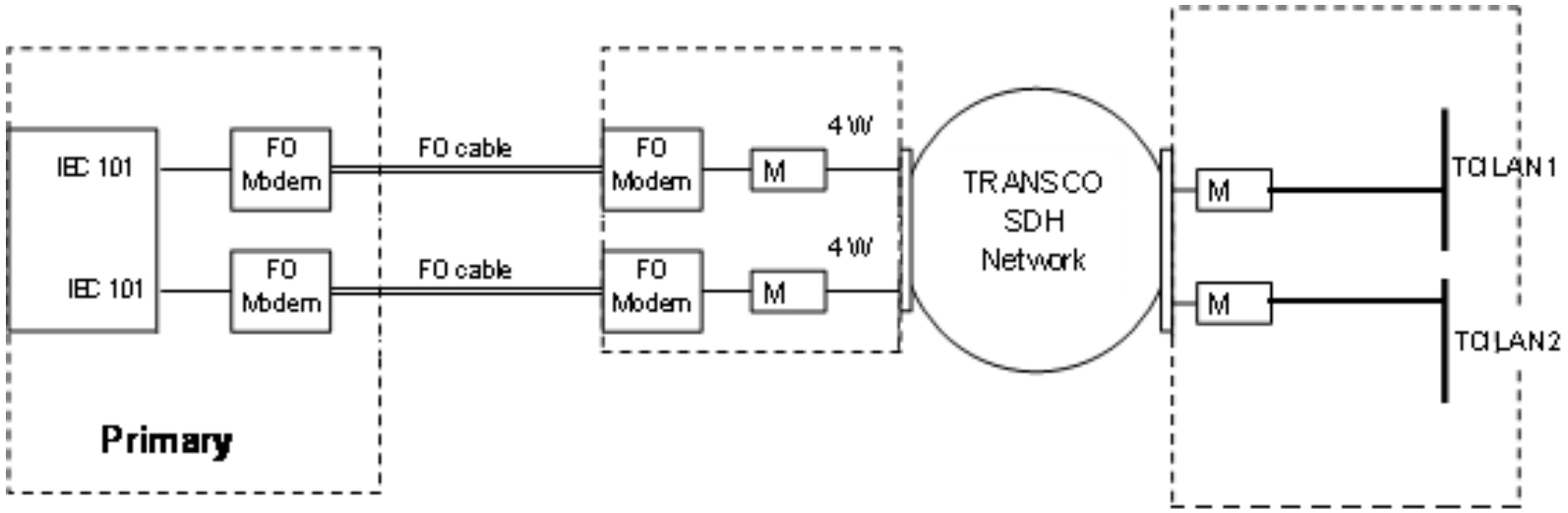


New substation case study.. Smart Grid ready !

- Design of new substation were revised and equipped with the latest IT equipment to formulate SCMS along with the integration to the DMS



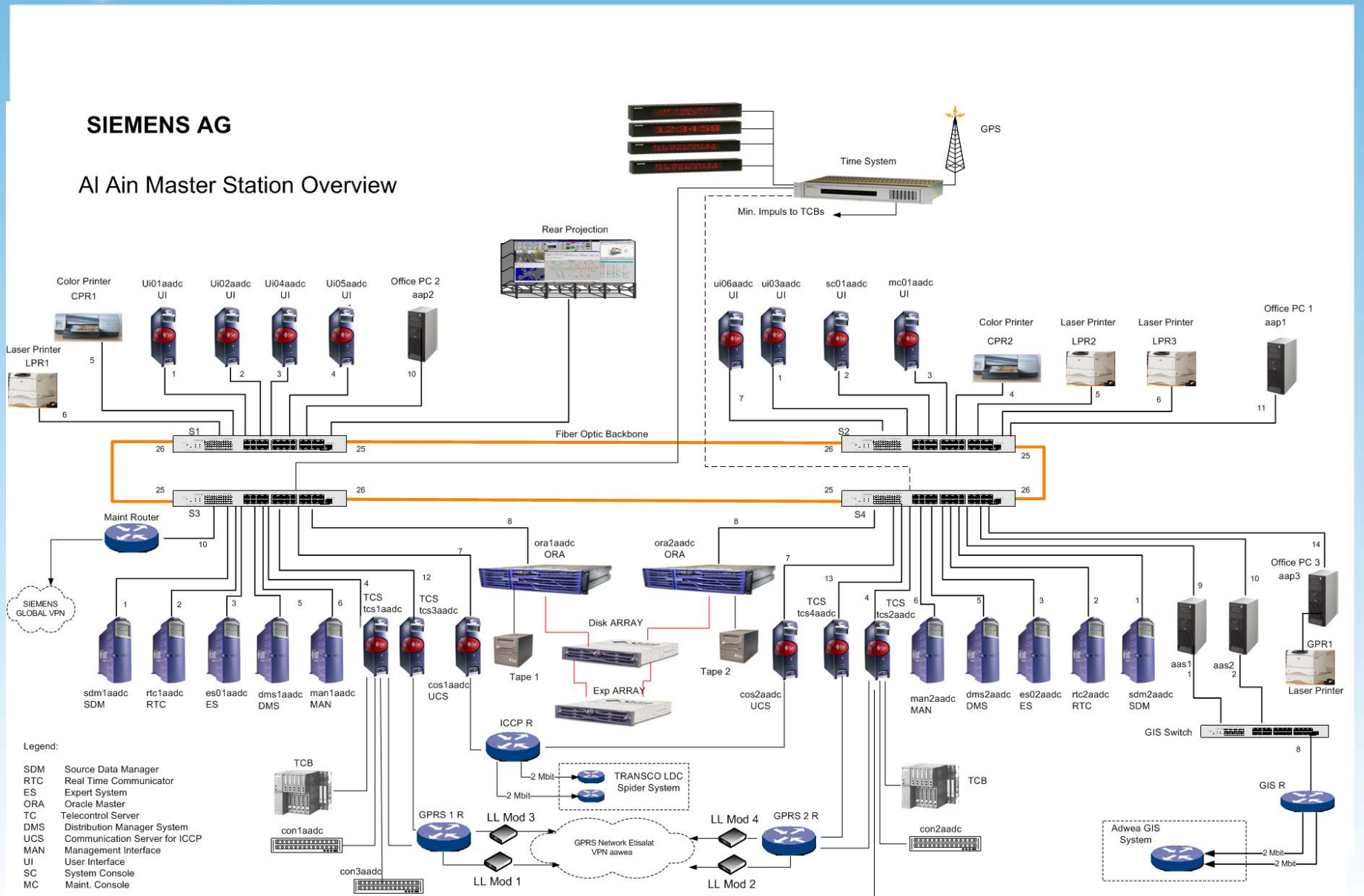
Communication to DMS; Fiber Cable Based



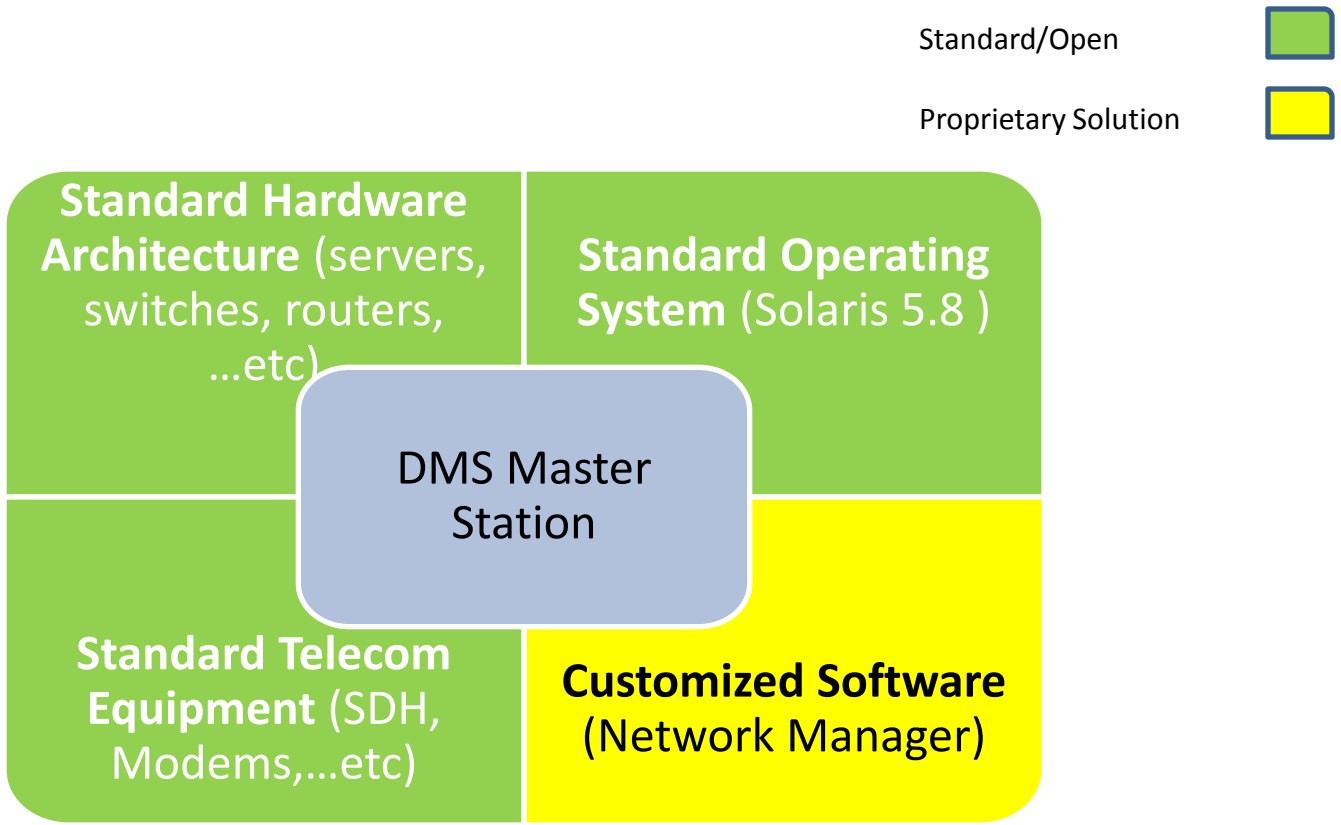
Legend

FO Fiber Optic
M Modem
4W 4 Wires
TCI Telecontrol Interface

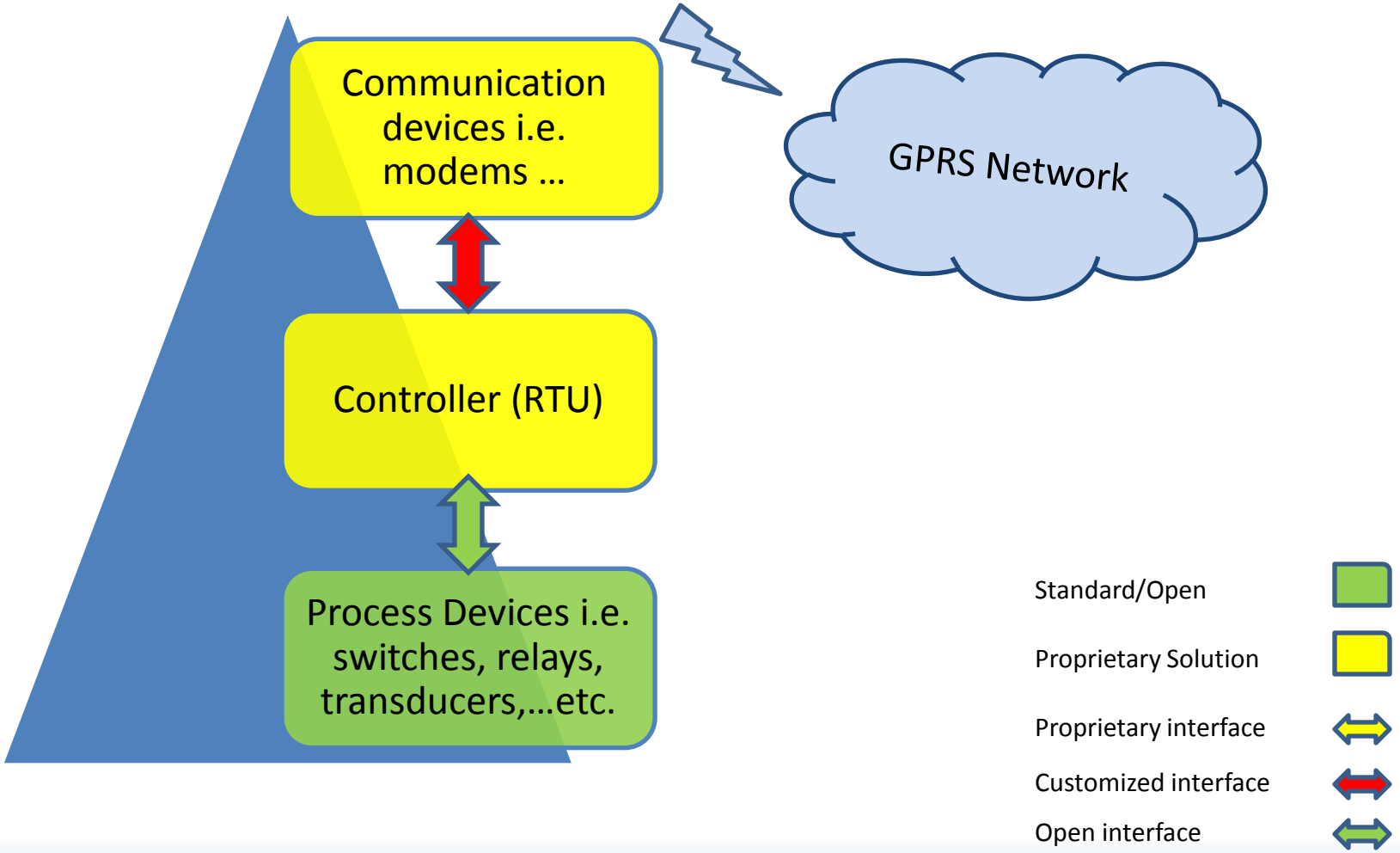
Distribution Management System



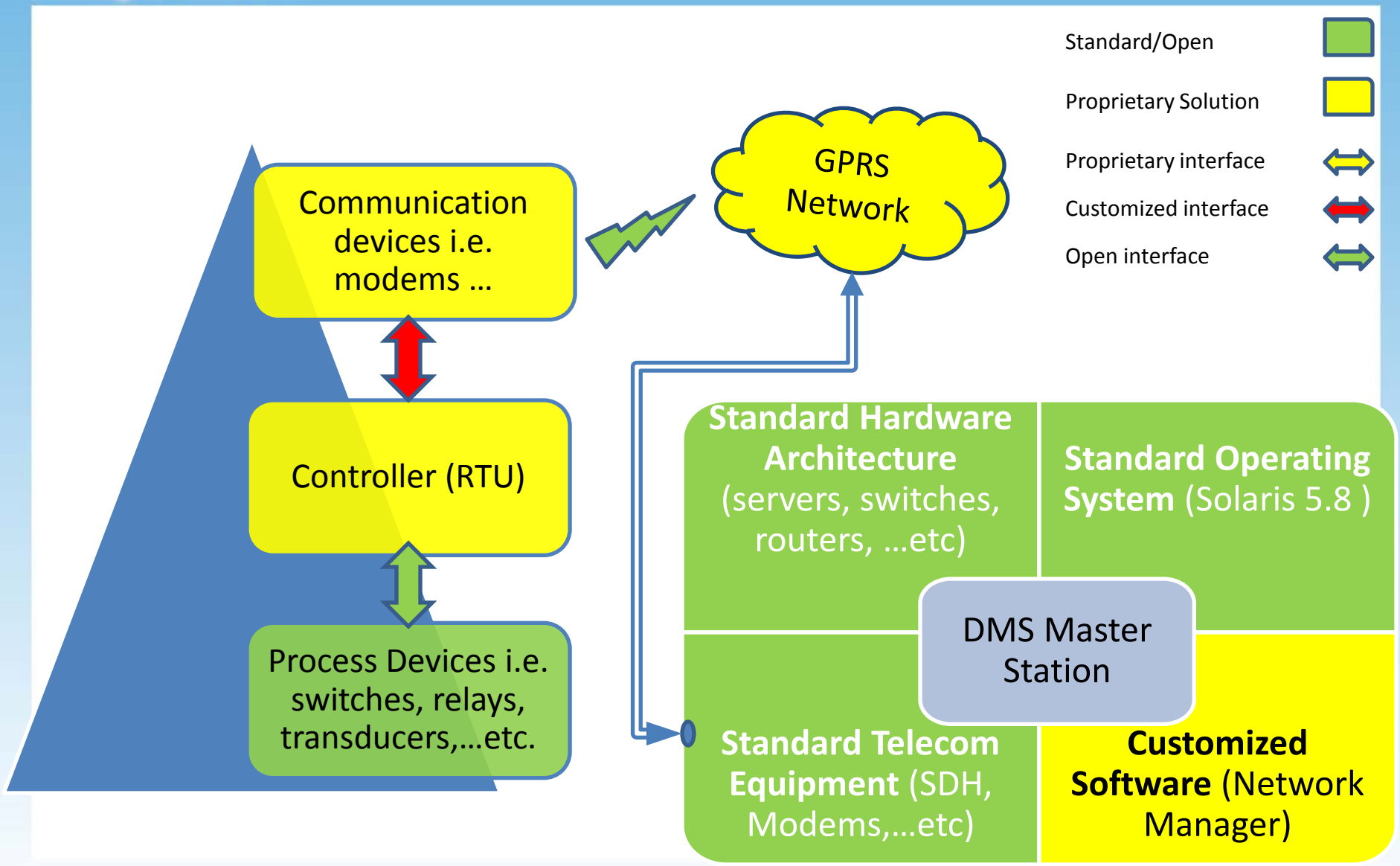
Interoperability in Master Station



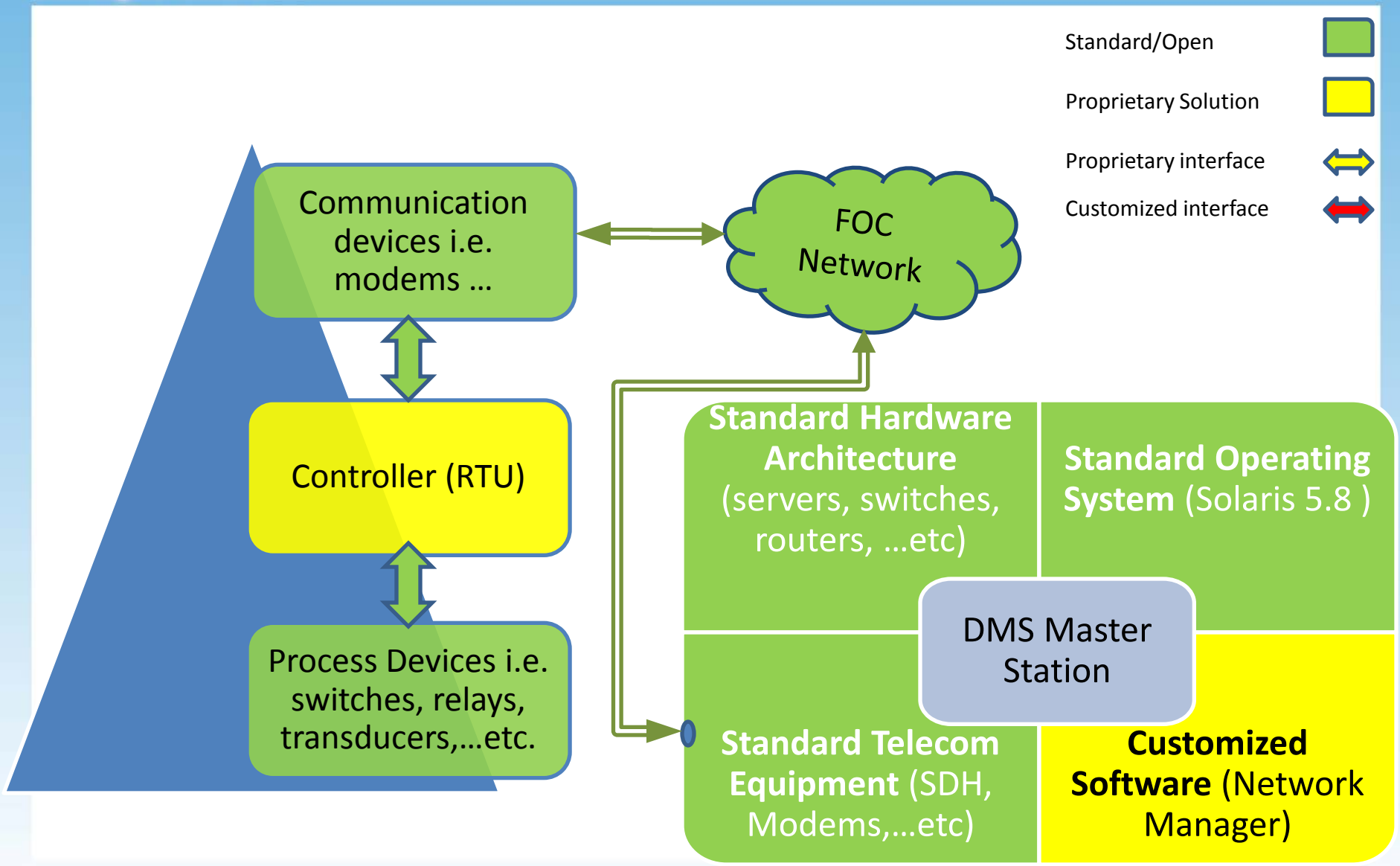
Interoperability at Site-GPRS communication case



System Interoperability-GPRS



System Interoperability-FOC

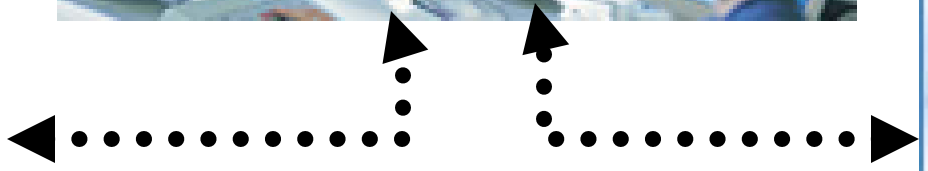


Future plans… *Short term*

- *Establishing AADC communication Network*
  - *Fiber optic network*
    - *Power cables*
    - *Sewage pipelines*
  - *Meshed Wireless Network*

Future plans… *Short term*

- *11 kV Ring Main Unit Substations' Automation*
- *11 kV Overhead lines Auto-Reclosers and sectionalizers' Automation*



Wireless Communication

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Future Plan… *Long term*

- Connection of outage management system to the DMS.
- Integration of AMR system to DMS
- intelligent houses, possible green energy sources and even recharging electric vehicle

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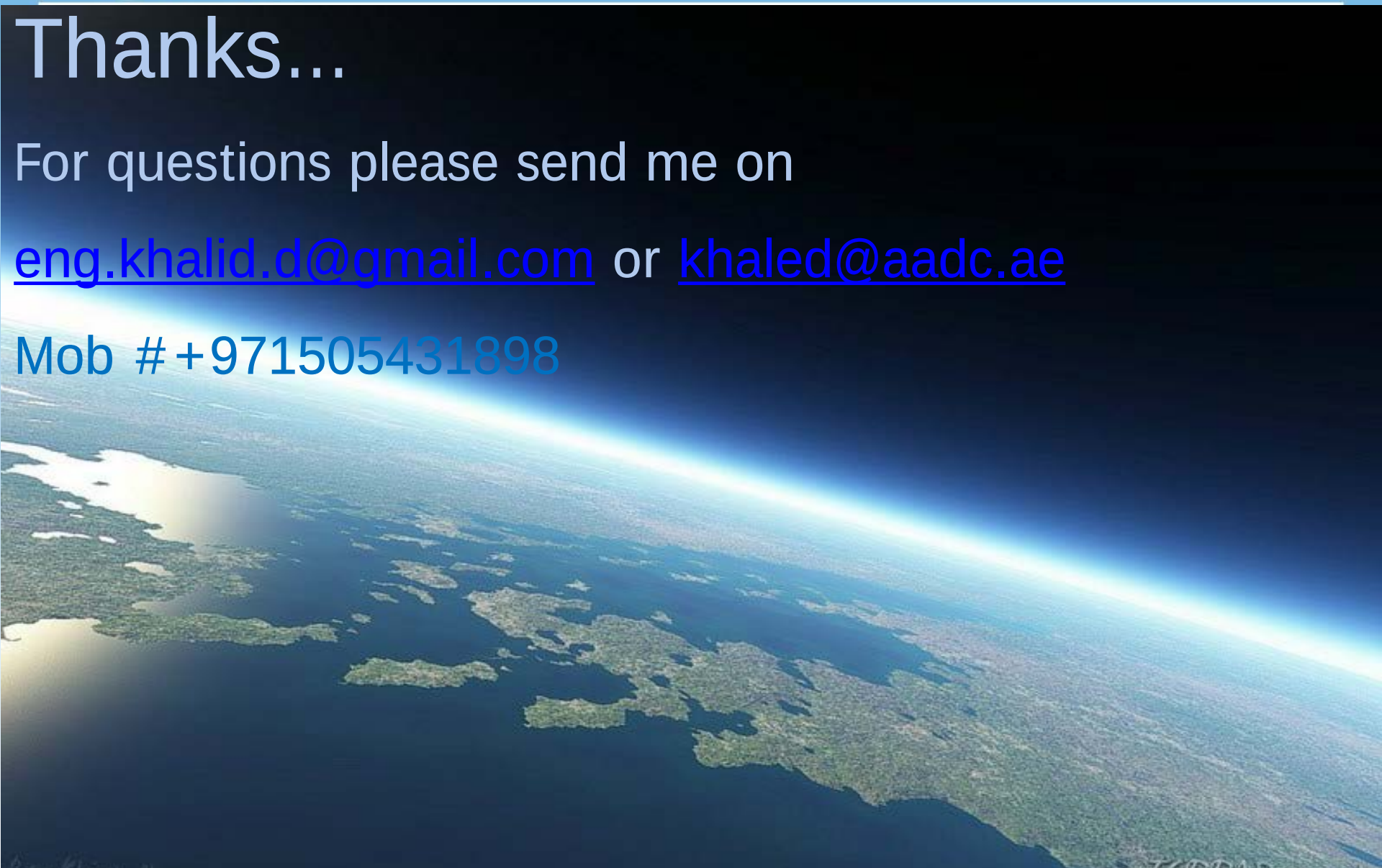
Conclusion

- No system can be built on only open standards without introducing customized solutions
- Customized solutions must fulfill sufficient level of interoperability
- A regulator must participate in standards revision and to set the rules for interoperability



Thanks...

For questions please send me on

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