MICIE

SEVENTH FRAMEWORK PROGRAMME

Information Society

www.micie.eu

ICT-SEC 225353

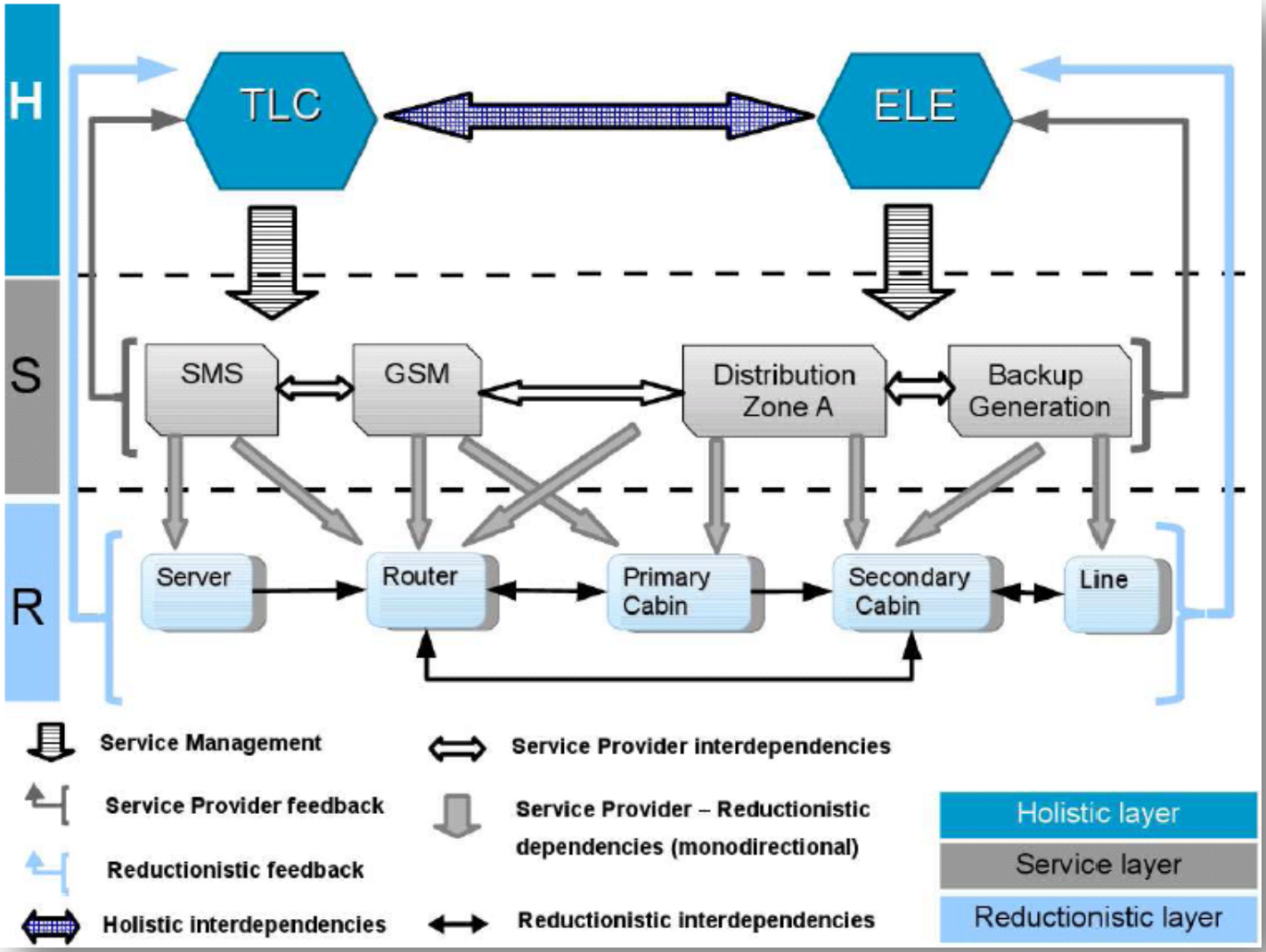
MICIE Final Workshop

A Risk Prediction Tool for Interconnected Critical Infrastructures

prof. Stefano Panzieri
Computer Science and Automation Dept.
panzieri@uniroma3.it

Mixed Holistic Reductionistic (MHR) Modelling

THE MIXED HOLISTIC-REDUCTIONISTIC MODELLING PERSPECTIVE



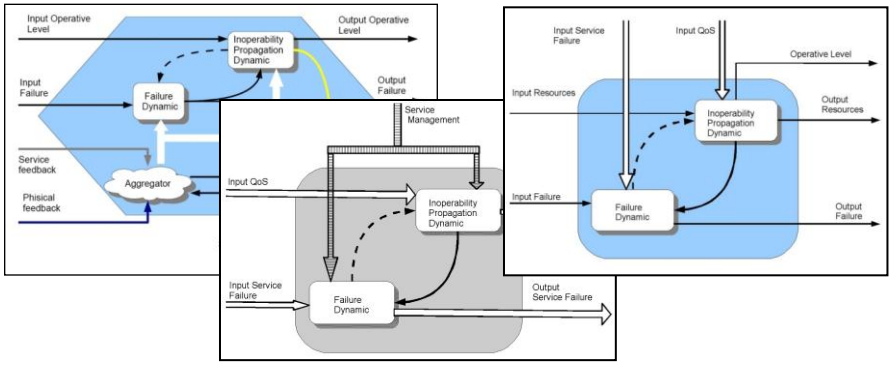
Behaviours (physical or logical or political) not emerging from R layer

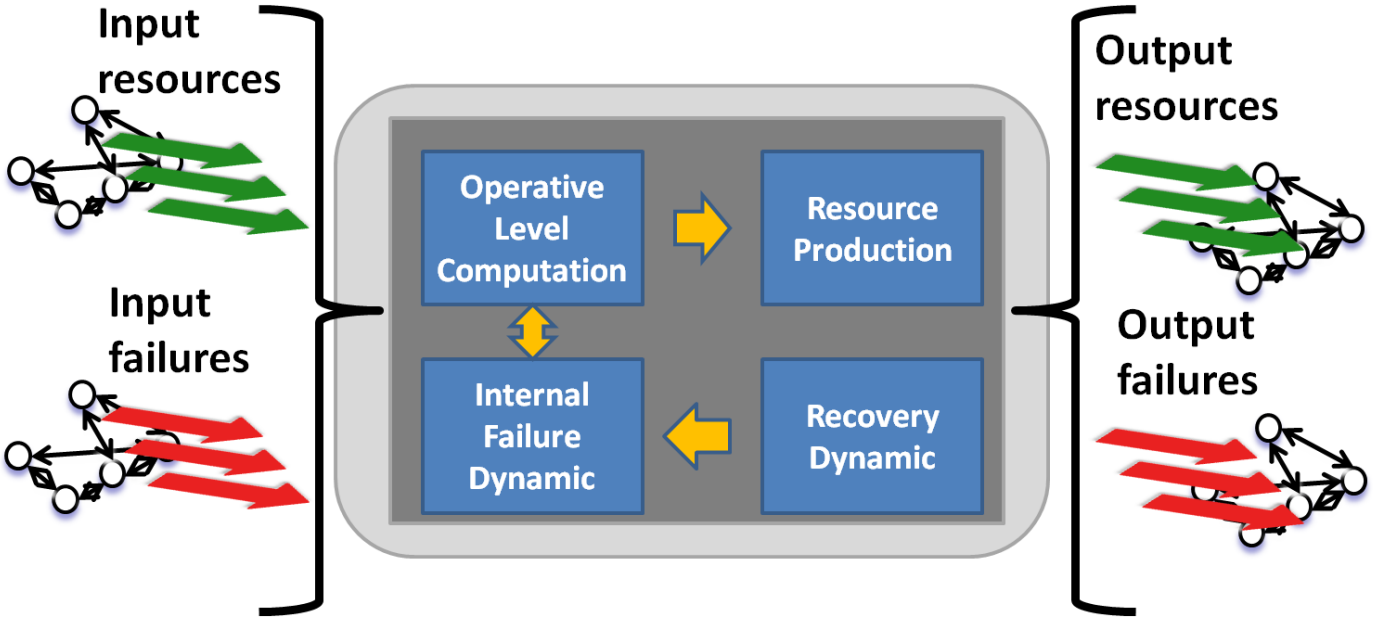
Expressions of both holistic and reductionistic models

Intra-Inter-Infrastructure homogeneous layer capturing interdependencies

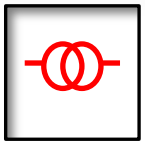
MHR in a service oriented modeling framework

- MHR-CISIA Simulator is build using the following blocks that take into account
  - Inoperability propagation
  - Failure propagation





MHR ECI REDUCTIONISTIC ELEMENTS



MV Station: provides current and “receives” impedance

SUBNET (i.e. WIRE) simply forwards current and impedance

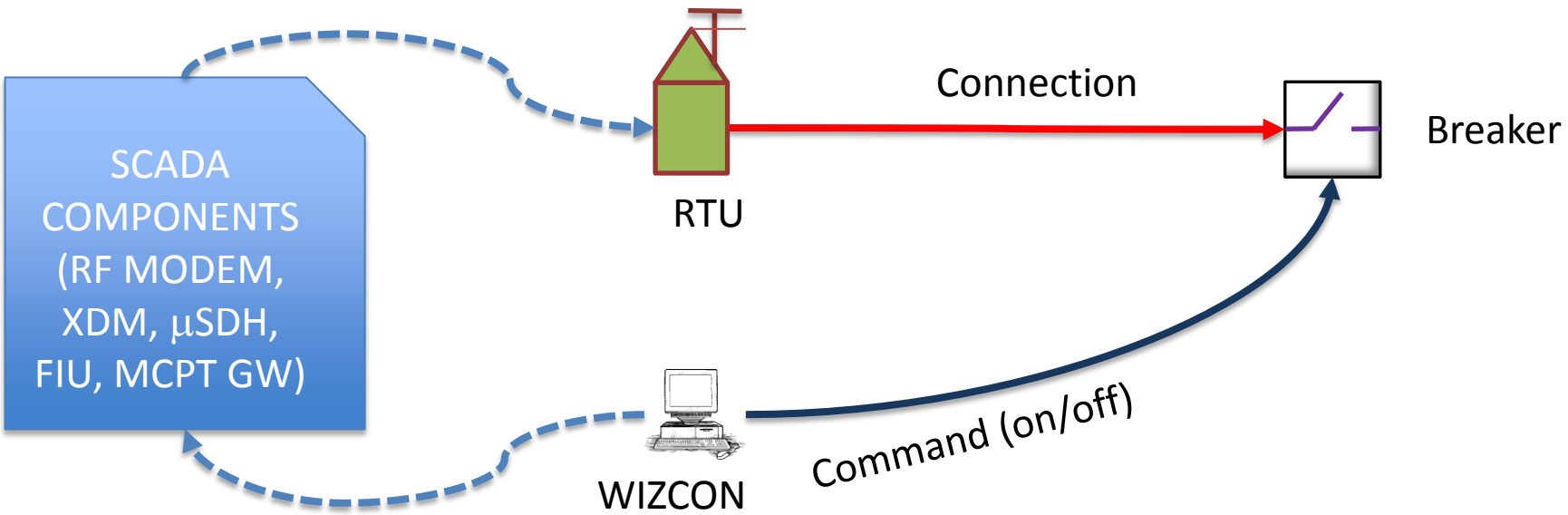
JOINT: ramification of the network

BREAKER : telecontrolled switch

LOAD customer that requires a current and provides an impedance

The production/consumption of Electrical quantities is intended as a dependency.

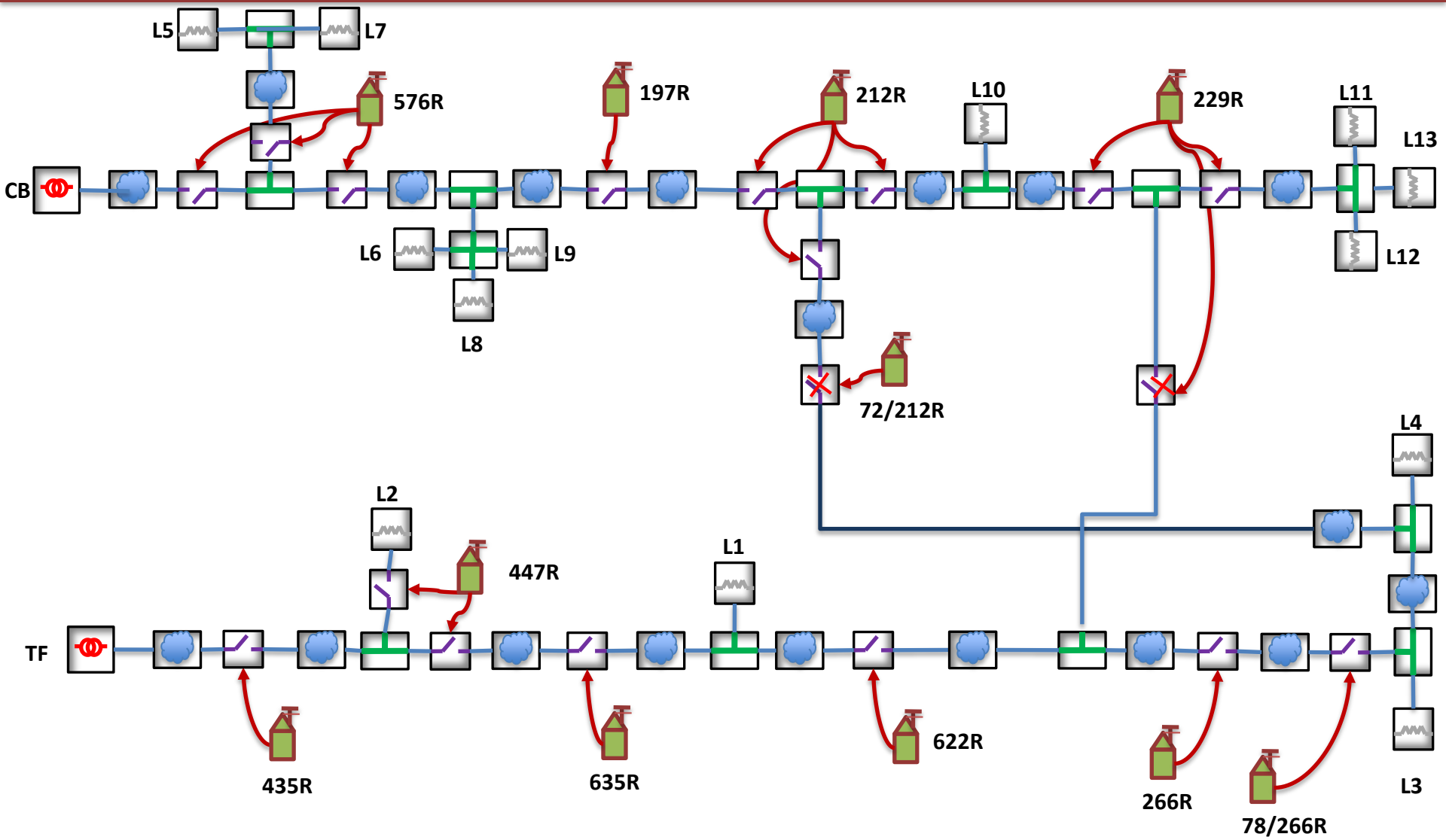
The MHR model is not an exact electrical simulator



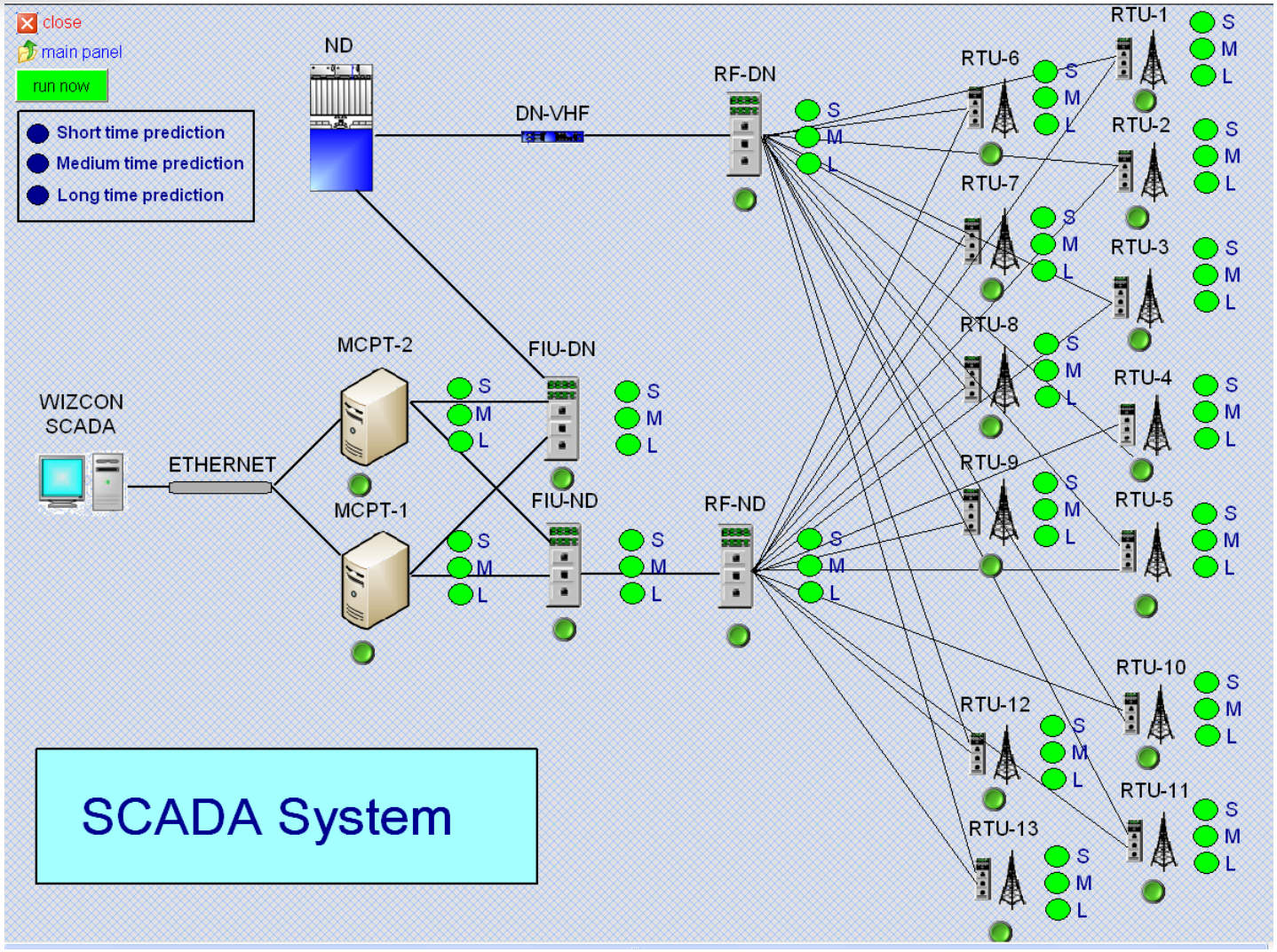
The Wizcon c.c. sends the command

The command can be executed if the connection with the RTU is active

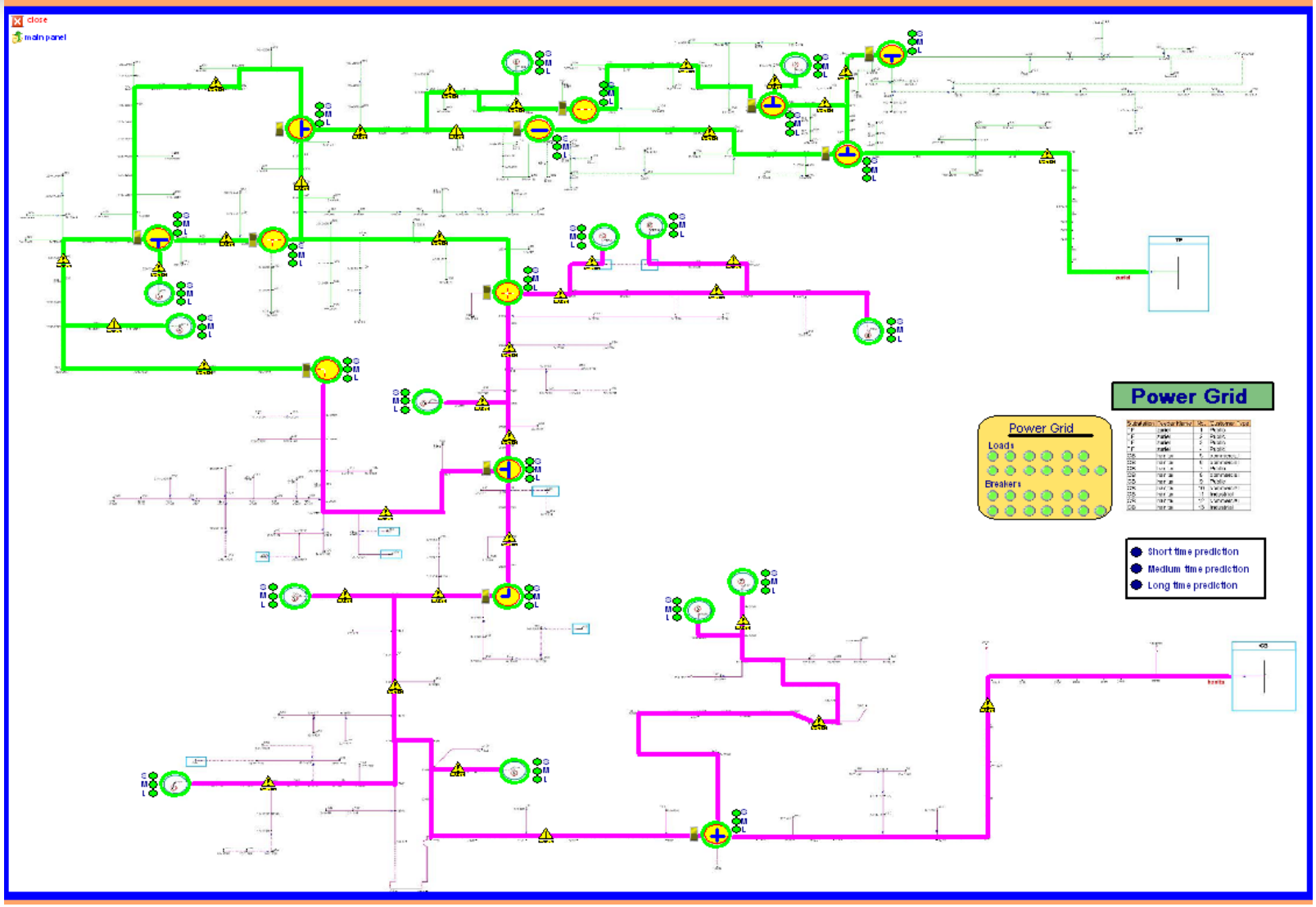
POWER GRID REDUCTIONISTIC MODELING

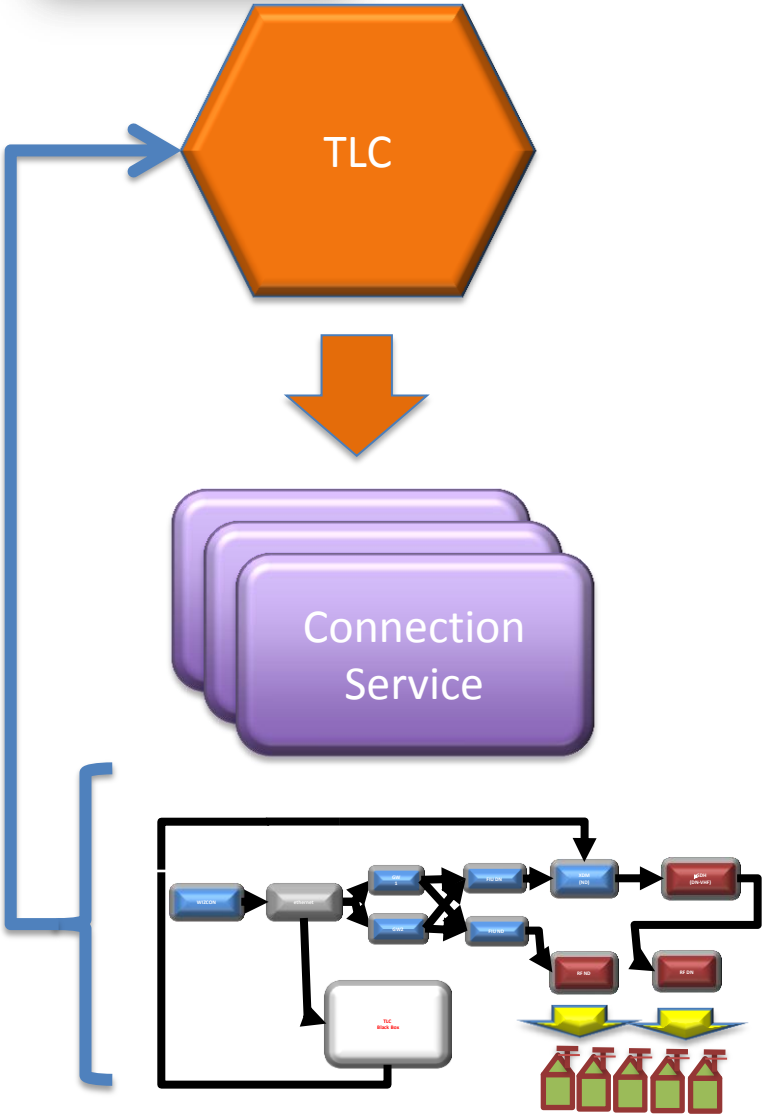


OPERATOR INTERFACE – SCADA elements



OPERATOR INTERFACE – Electric Grid



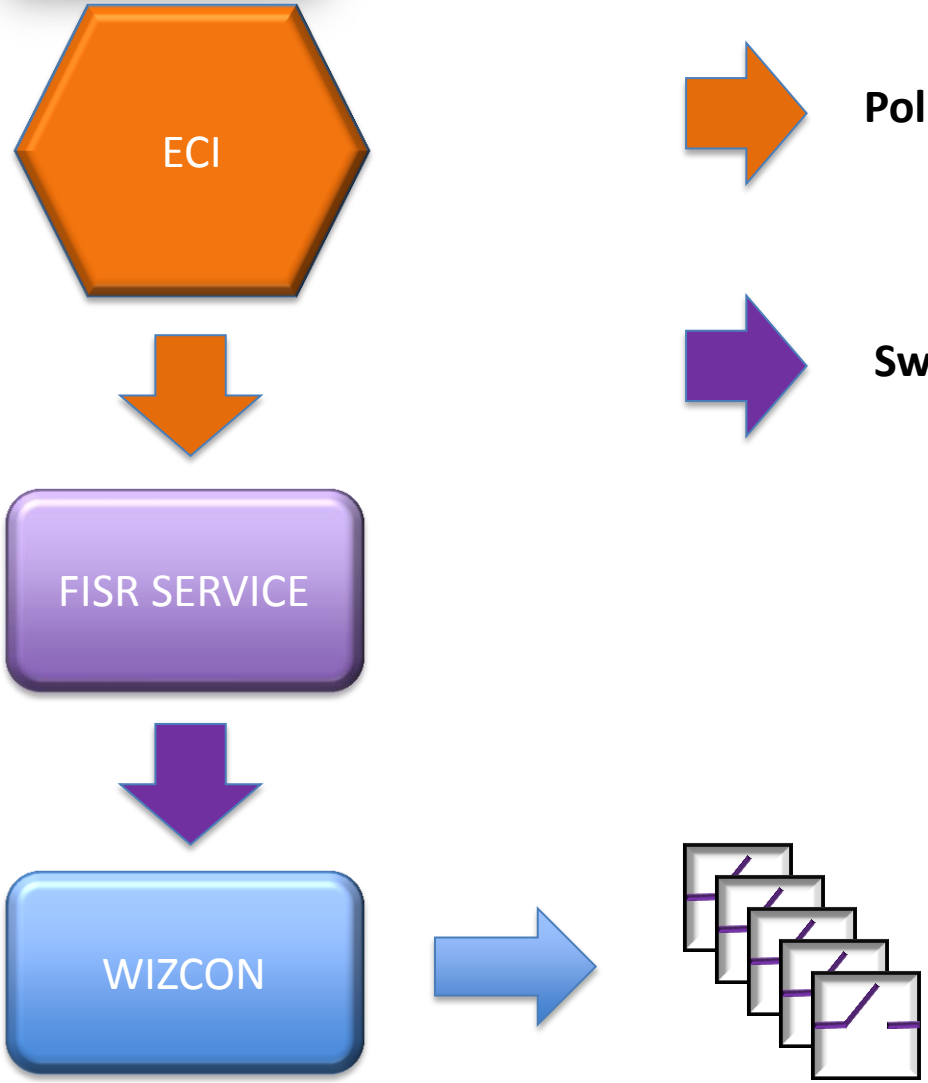


An approach for the Estimation of the QosS

The logic has been implemented in the TLC holistic node

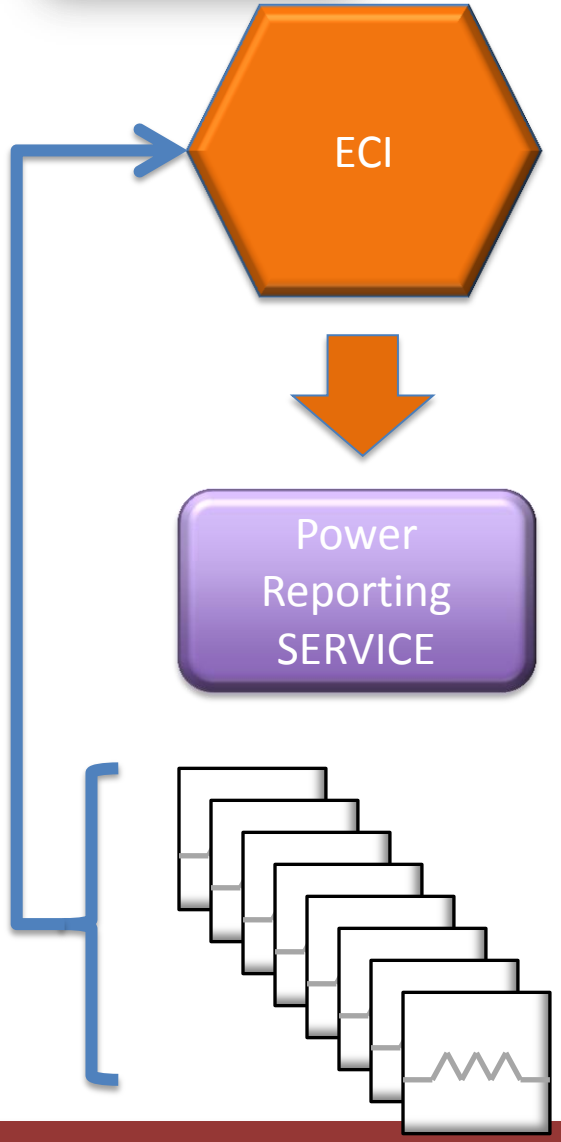
The TLC node uses the feedbacks from the reductionistic nodes

FISR SERVICE & SWITCHING LOGIC



Policy: Random/Incremental/Index Based

Switching logic: who and how

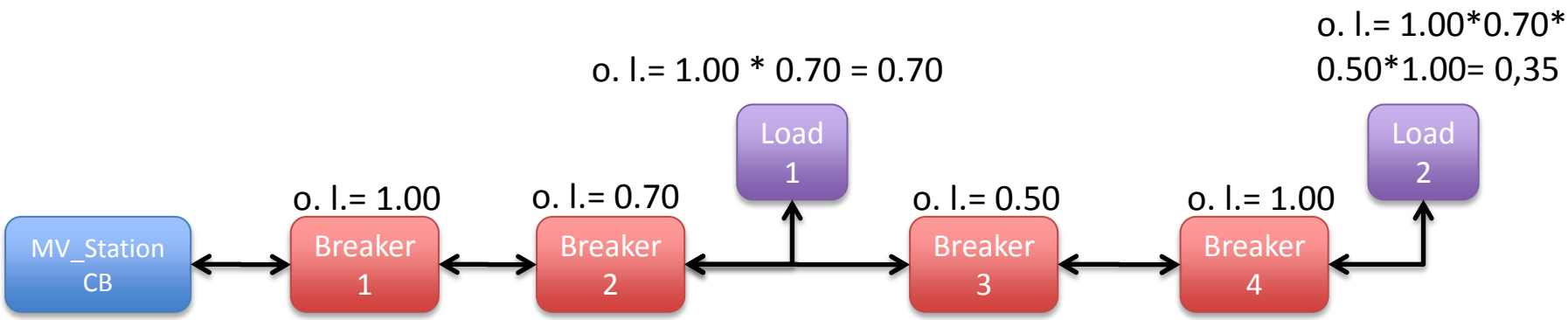


The state of the loads is fed back to ECI holistic node

Data is aggregated at holistic level

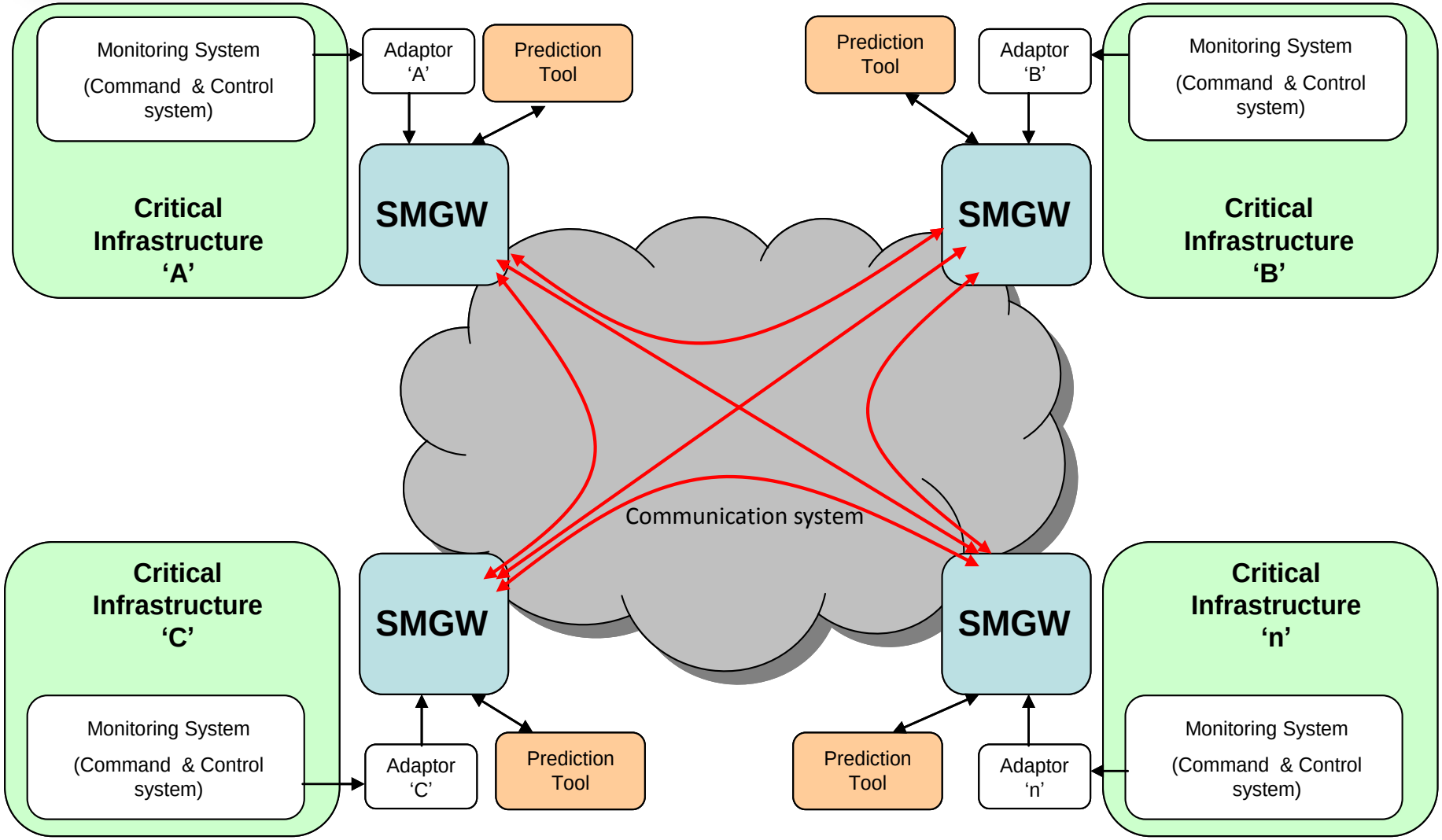
Overall Status of the Grid (i.e. energized %) is computed at service level

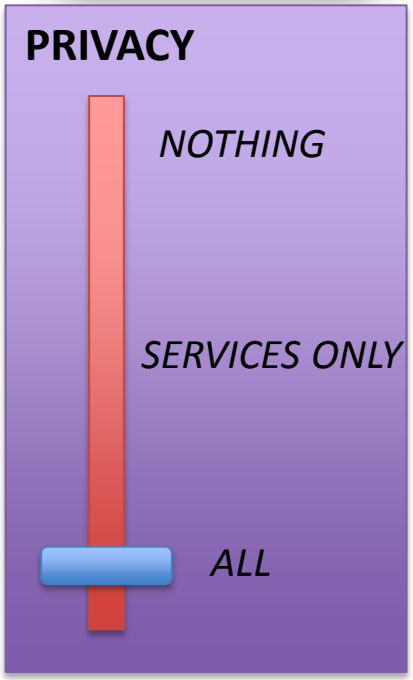
- It is possible to have also a service for each customer, whose operativeness represents the risk for that customer in terms of possibility to reconfigure the network for that element

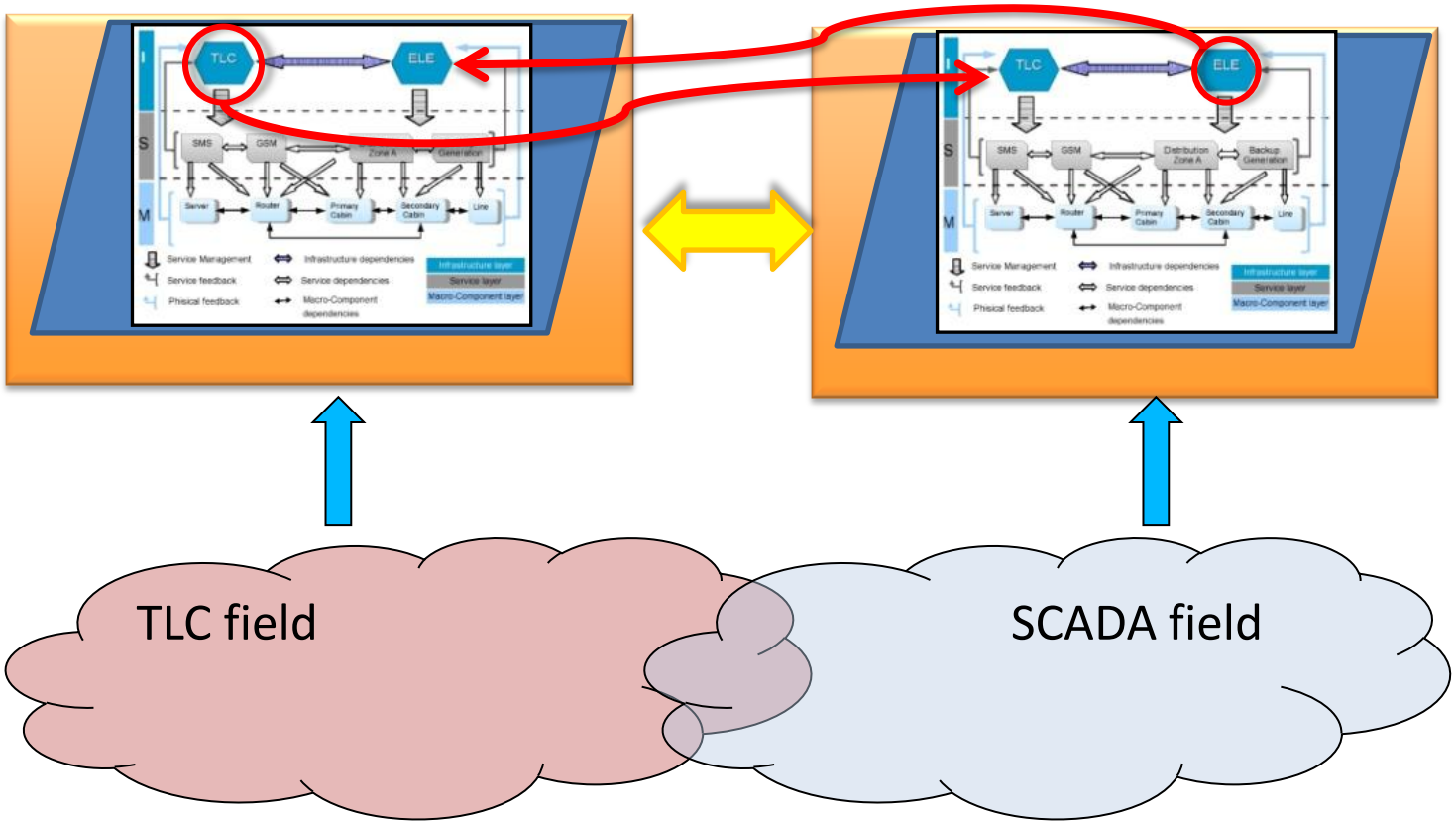


Distributed Prediction Tool Design

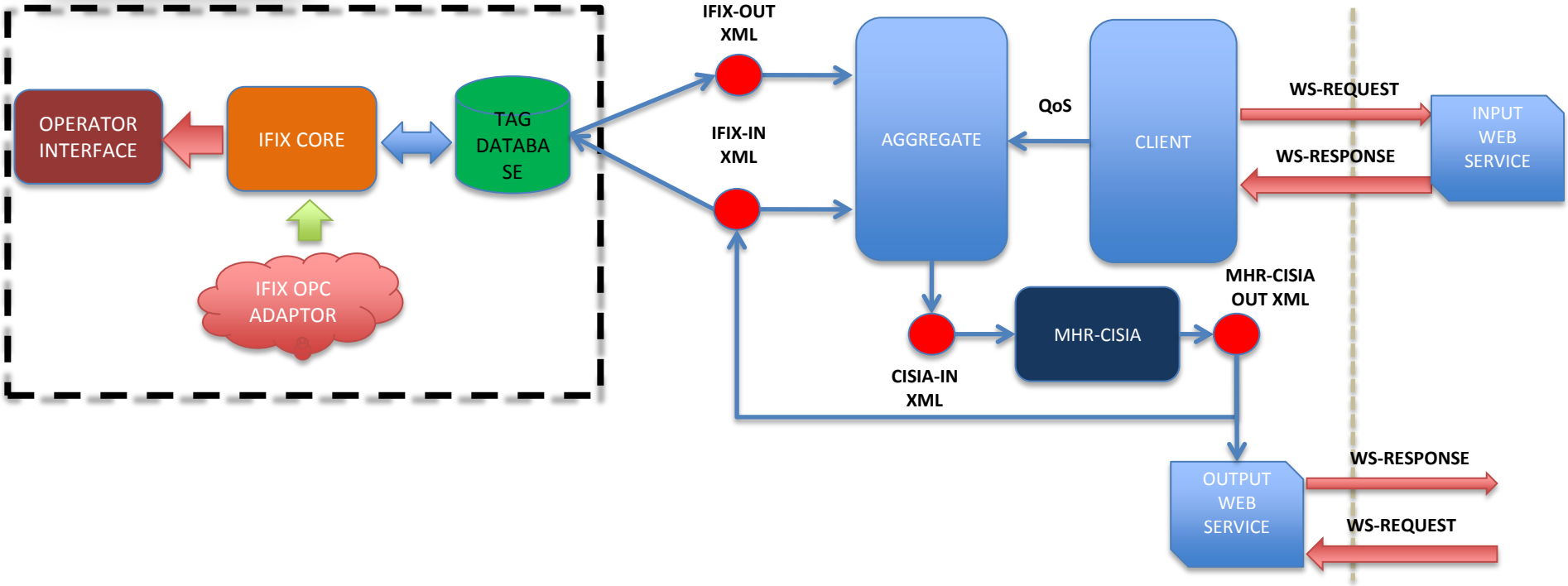
SECURE COMMUNICATION




PRIVACY
NOTHING
SERVICES ONLY
ALL


TLC
ELE
TLC field
SCADA field

PREDICTION TOOL OVERVIEW

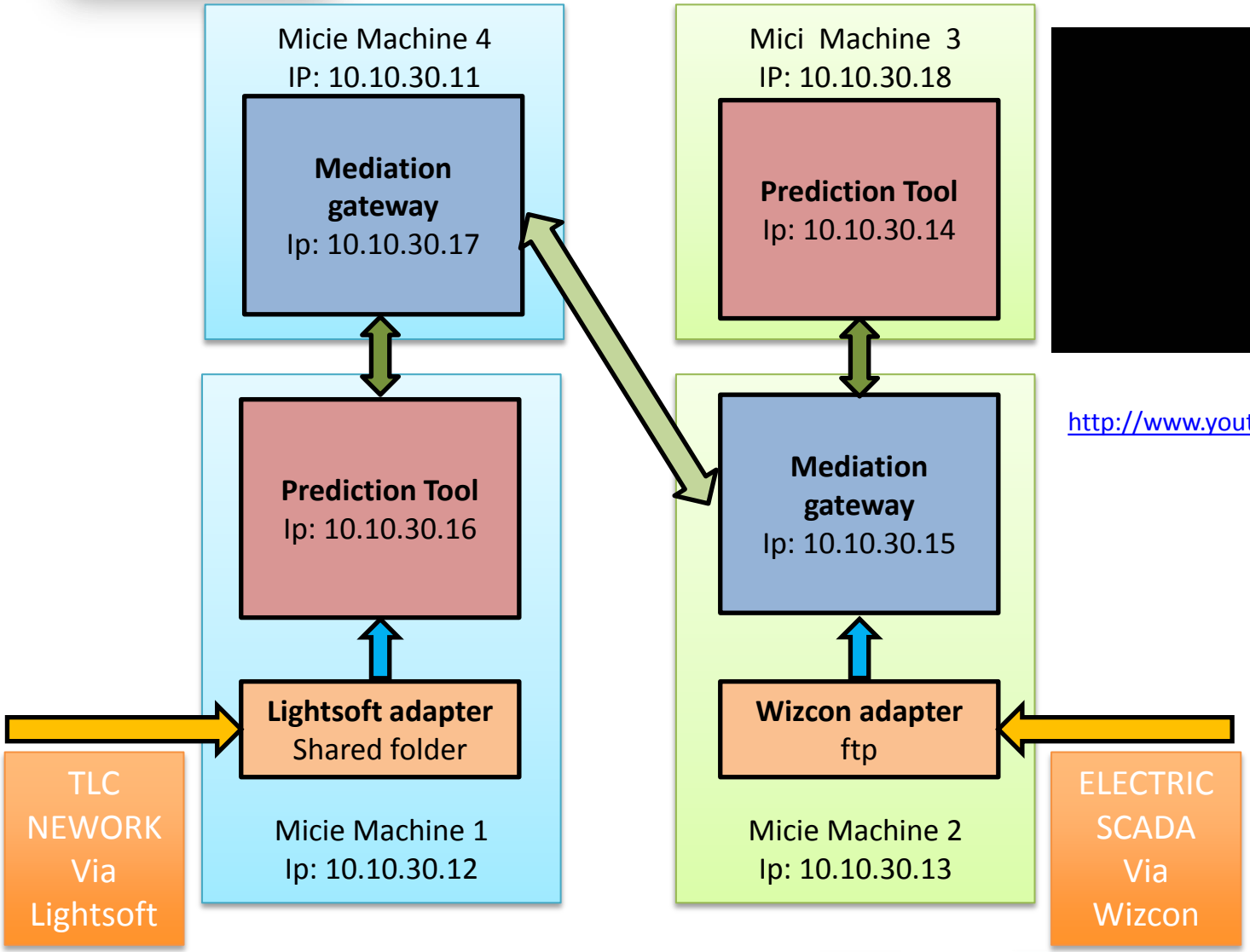


Data from the field, and from other tools is aggregated (worst case) and a new prediction is computed by the MHR-CISIA predictor.

The Output web-service publishes the new prediction.

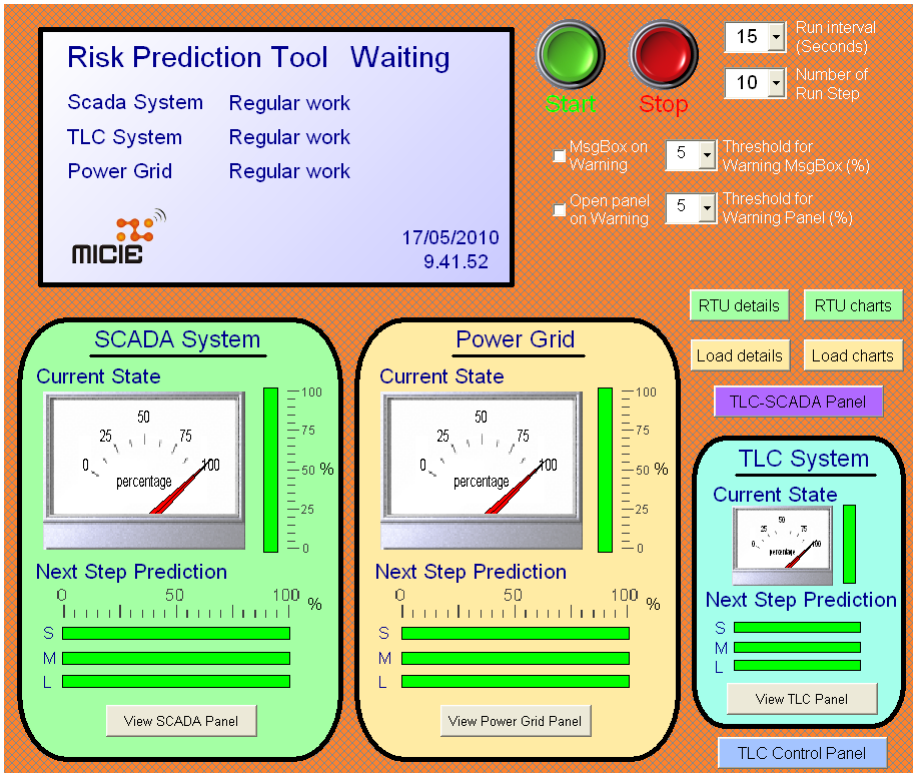
The system cannot oscillate, since no repair dynamic is considered.

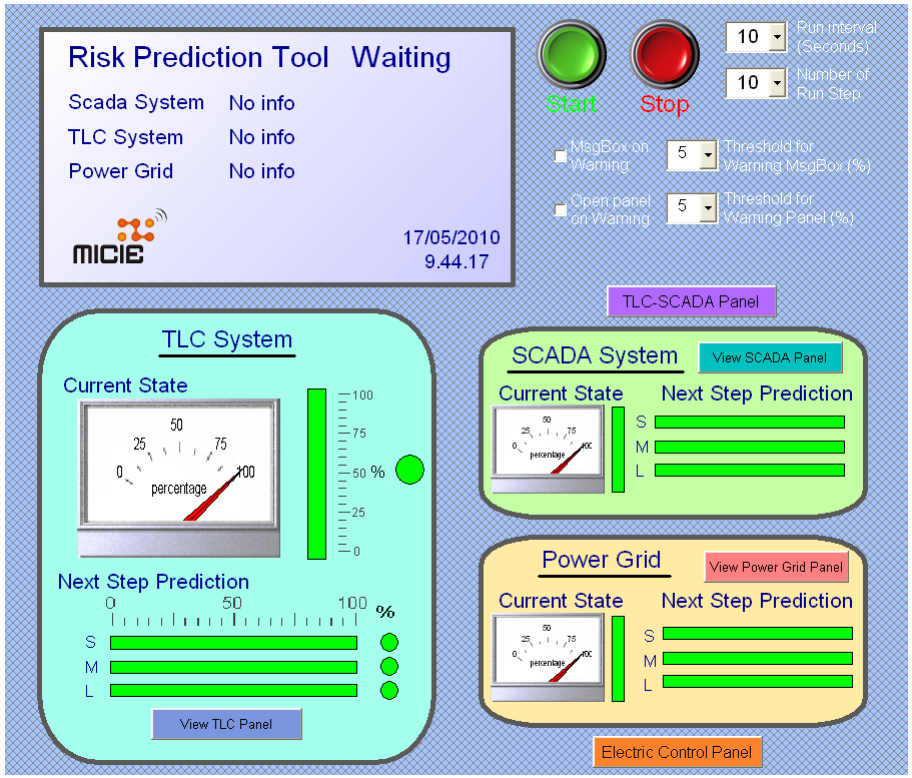
IMPLEMENTEND ARCHITECTURE WITH 4 MACHINES



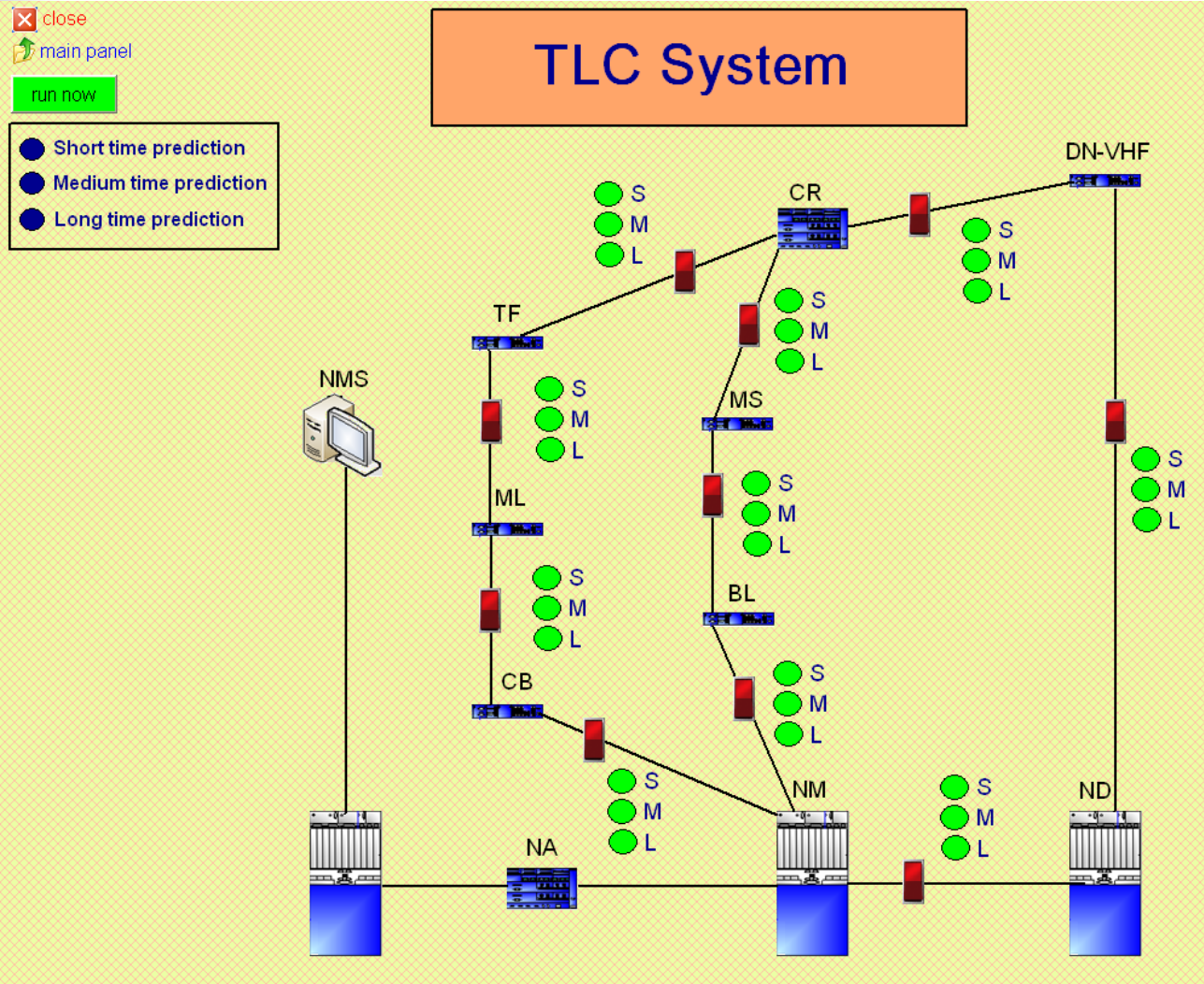
http://www.youtube.com/watch?v=PFyZU0q4BtI

Operator Interface - Main Control Panel

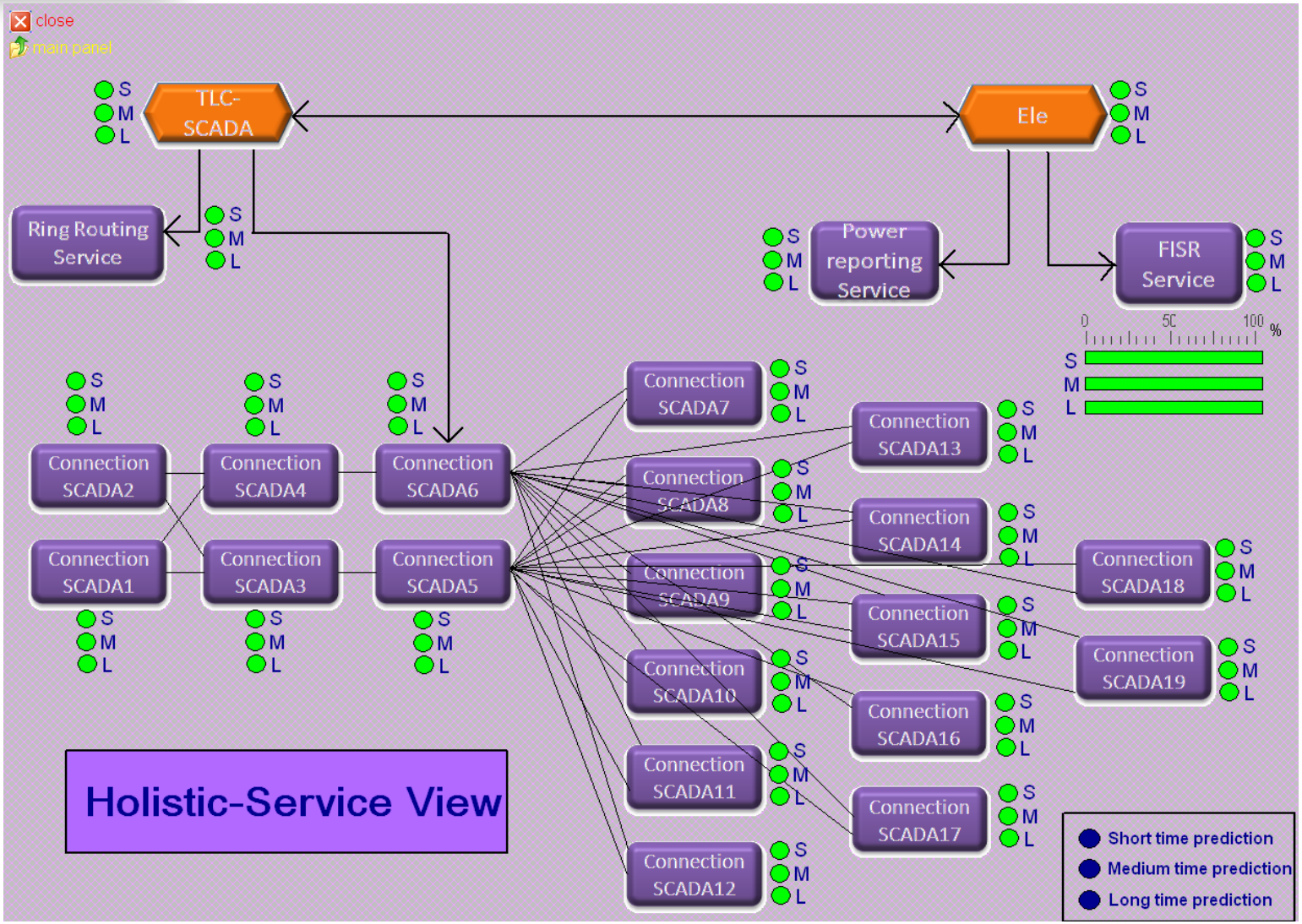




Operator Interface – TLC System



Operator Interface – Holistic/Service Layer



http://www.youtube.com/watch?v=GN5e7FcYzAc


Thank You!