Emulate and study the performance of a radio network for a SCADA system, for water distribution, using NetSim

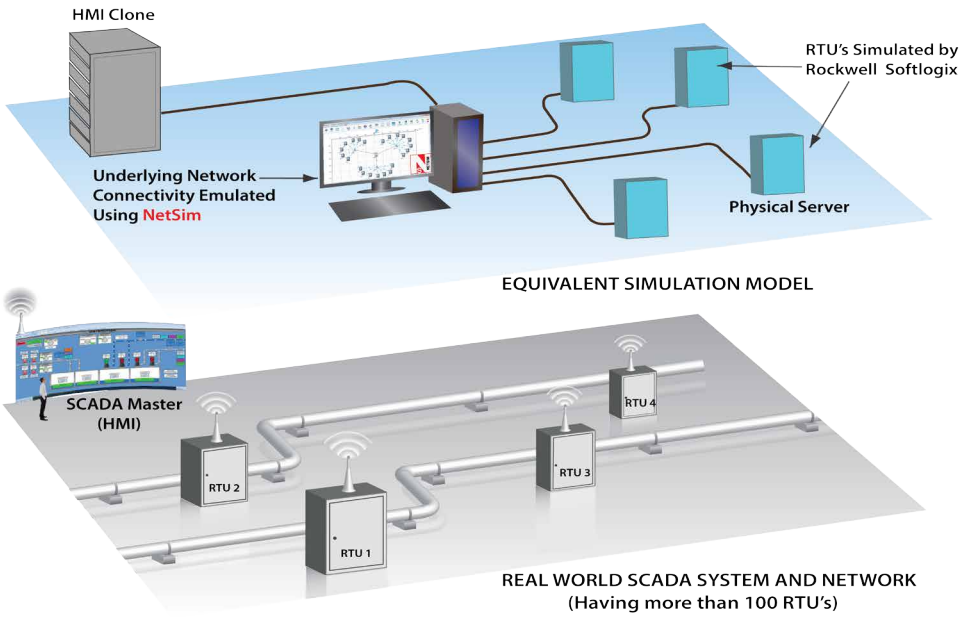
Use Case: The water distribution network comprises of three components:

1. Remote Terminal Units (**RTU**) which are field operational units performing local process control;
2. Central Human Machine Interface (**HMI**) which provides visualization and control of RTU activity individually and collectively from a central location;
3. An interconnecting network comprising of **radios**, **switches**, **routers** and **transport media**.

Each RTU has a router which acts as a layer-3 device and includes a gateway and a firewall. Each RTU will also be a separate IP subnet to facilitate encoding of location and other information in the IP addressing. The HMI is a redundant pair of SCADA nodes running as virtual machines on two physical servers at a single location which are also firewalled from the other network components.

Simulation Environment: This real-world system was first tested in a virtual laboratory environment comprising of hardware, software and interconnections as close to the actual system as possible.

The HMI VM was cloned into the sim environment. The RTU PLCs are modeled using Rockwell Automation's SoftLogix. A VM was used for each instance of SoftLogix. Each SoftLogix simulated six controllers in a single 17 slot virtual rack. NetSim emulator was used to interconnect these two components and to emulate the 3rd component i.e. the radio network.



Conclusion: Then in this virtual lab, numerous test scenarios were constructed and executed repetitively for normal operation as well as perturbed operation. Impairment scenarios were studied which included escalating latency, bandwidth constriction at various points, jitter tolerance, packet loss, packet reordering, route loss, failovers and single point of failure identification. An optimal design was the arrived at based on the simulation results.

Key Benefits

- **Cost effective alternative to testing in the real world**
- **Very quick set-up since it plug-n-play interconnectivity to SCADA simulators & VM's**
- **Covers a wide range of technologies: Switching, Routing, MANETs, Cognitive Radio networks, 4G-LTE networks, ZigBee networks**
- **Output metrics such as loss, delay, error, throughput, quality of service etc. can be measured and different "What-if" scenarios can be analyzed**

#214, 7th Main, 39th A Cross, Jayanagar 5th Block,
Bangalore Pin - 560 041, India.
Tele-fax : +91 80 2663 0624

Website : www.tetcos.com
E-mail : sales@tetcos.com
YouTube : youtube.com/tetcos

TETCOS