DEVICES WORLD

SCADA technology and the *Internet of Things (IoT)*

The *i*SCADA Platform

May 2017

Presented by
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DEVICES WORLD

*i*SCADA – Monitoring into the Future

Evolution and innovations in **Supervisory Control And Data Acquisition (SCADA)** Systems in the internet era

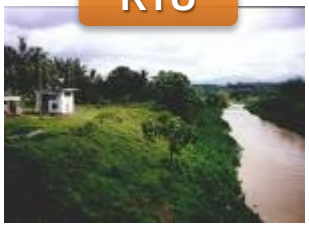
SCADA Point-to-Point

Remote User
Monitoring Station

Radio telemetry or
long distance phone calls

Data resides in RTUs
& Monitoring Station

RTU



Site 1

RTU

Site 2

RTU

Site N

Point-to-Point, Web Enabled

Remote User
Monitoring Station

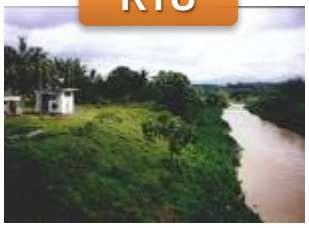
Separate web login
to each remote site

Data resides in RTUs
& Monitoring Station

Static Public IP address
required for every site

Internet

RTU



Site 1

Internet

RTU

Site 2

Internet

RTU

Site N

Distributed, Point-to-Point

Remote User
Monitoring Station

Management &
Maintenance challenge for
multi-tier, multi server
system

National

Data Scattered
over many locations

Region 1

Region 2

Region n

Site 1 | Site 2 | Site n

Region 1

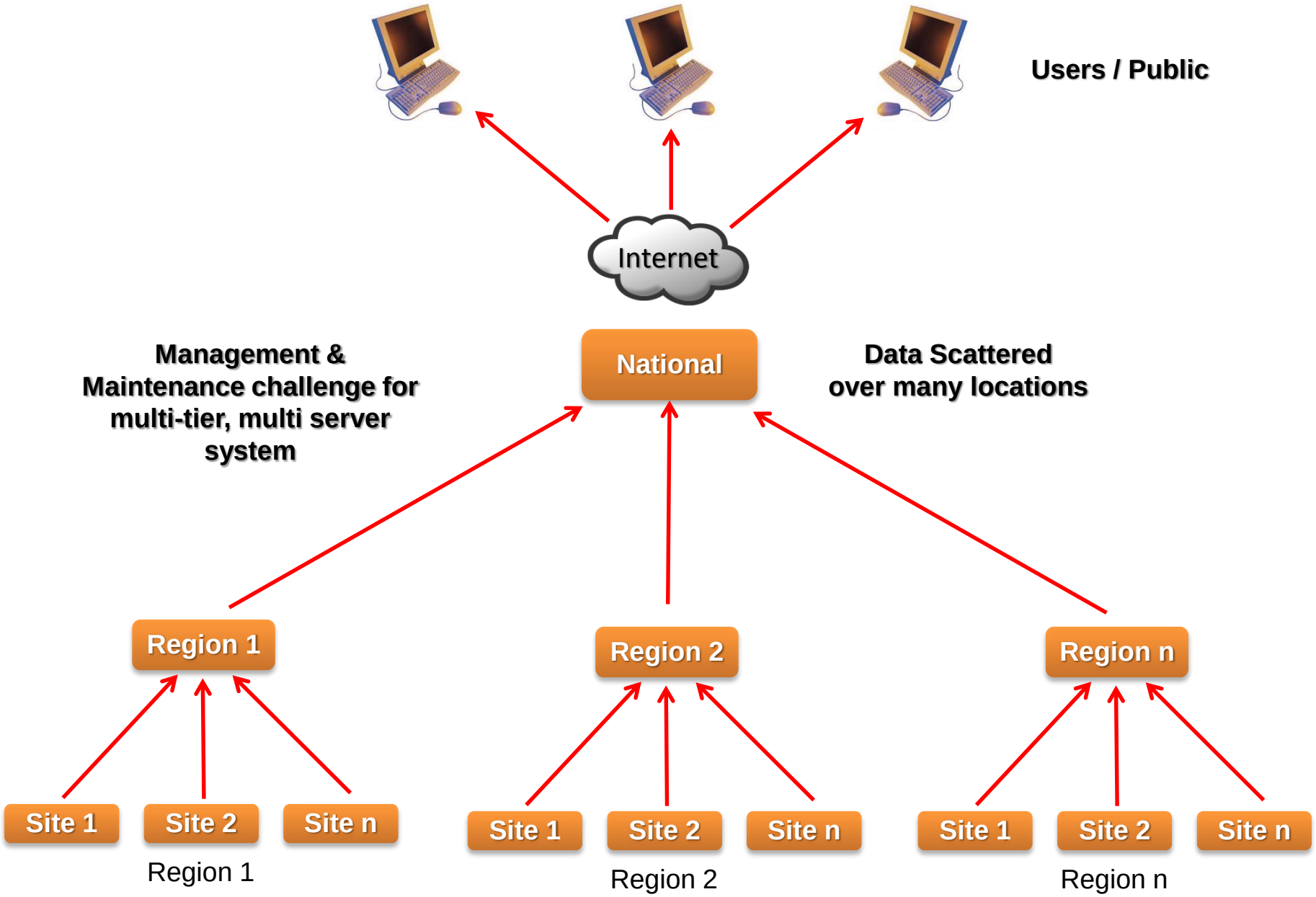
Site 1 | Site 2 | Site n

Region 2

Site 1 | Site 2 | Site n

Region n

Distributed, Point-to-Point, Web Enabled



Hosted, End-to-End IP

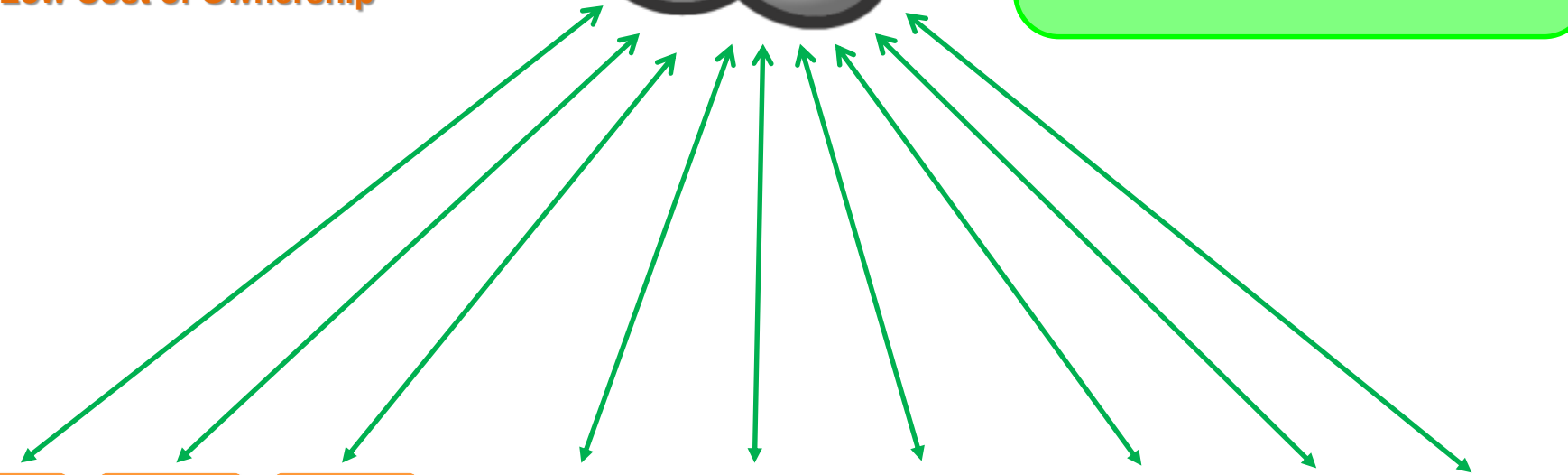
Users / Public

Hosted Model Benefits

- → No Capex for Software
- → No Software upgrade cost
- → No IT infrastructure issues
- → No IT human resources issues
- → Low Cost of Ownership

iSCADA

Technology Platform



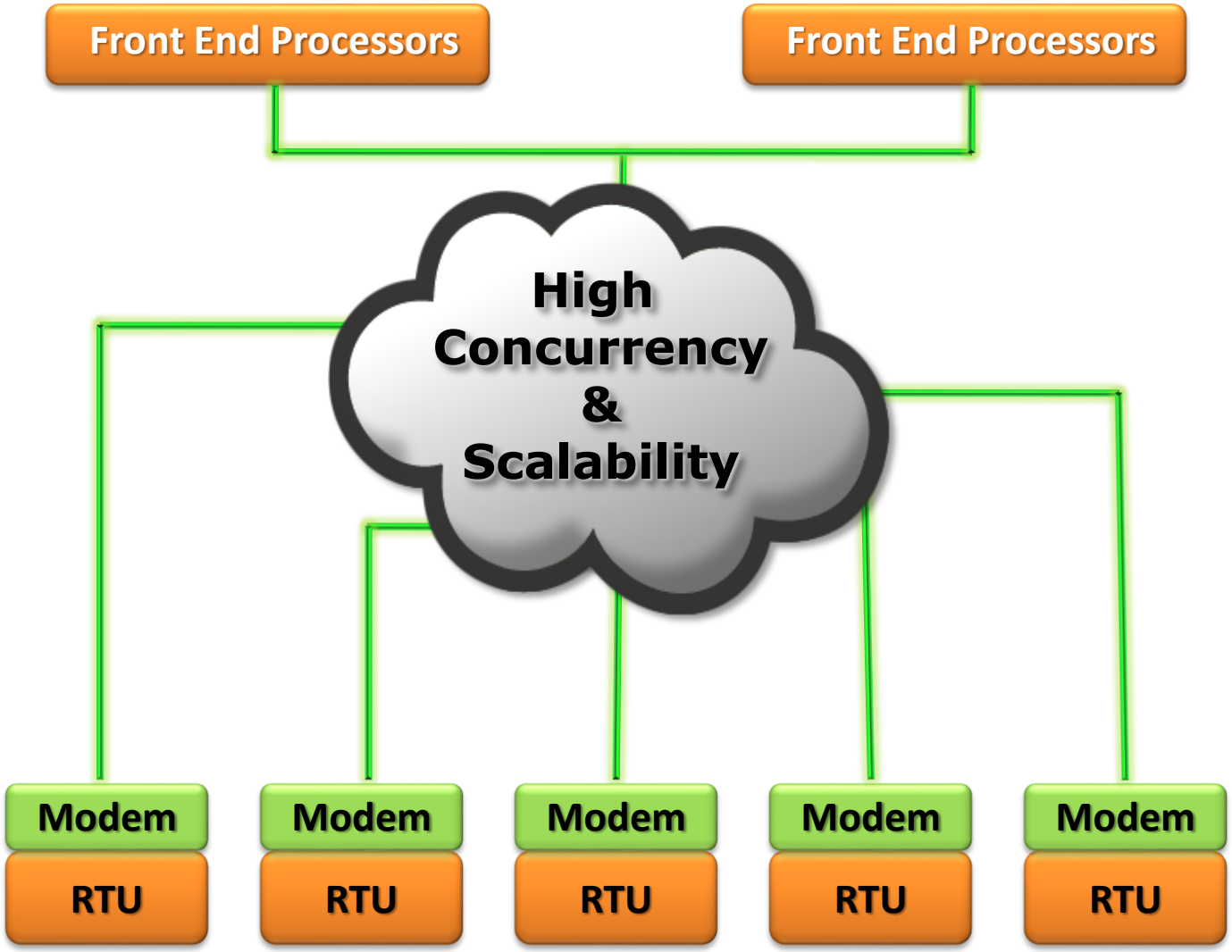
Region 1

Region 2

Region n

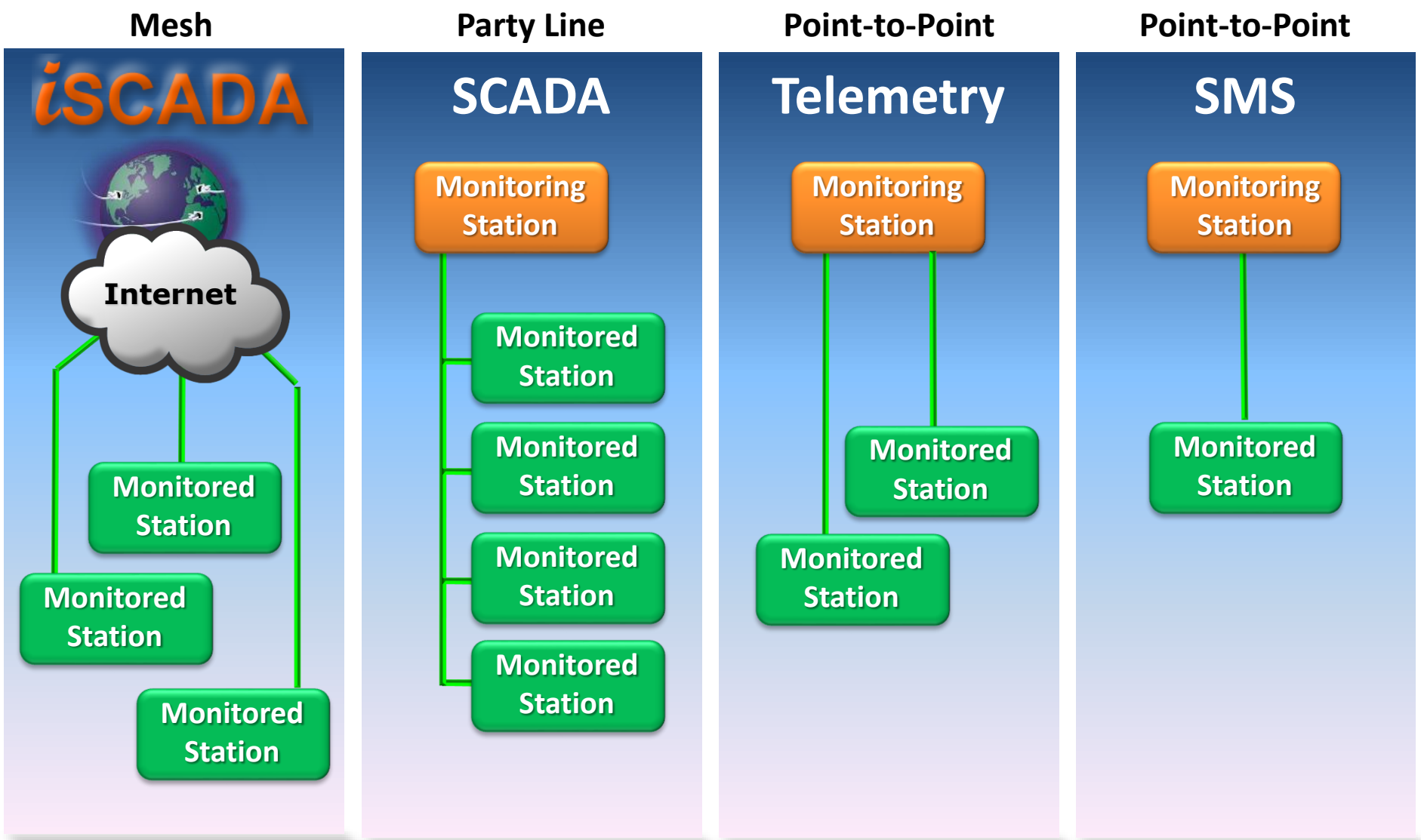
Product: Differentiation

High Concurrency & Scalability



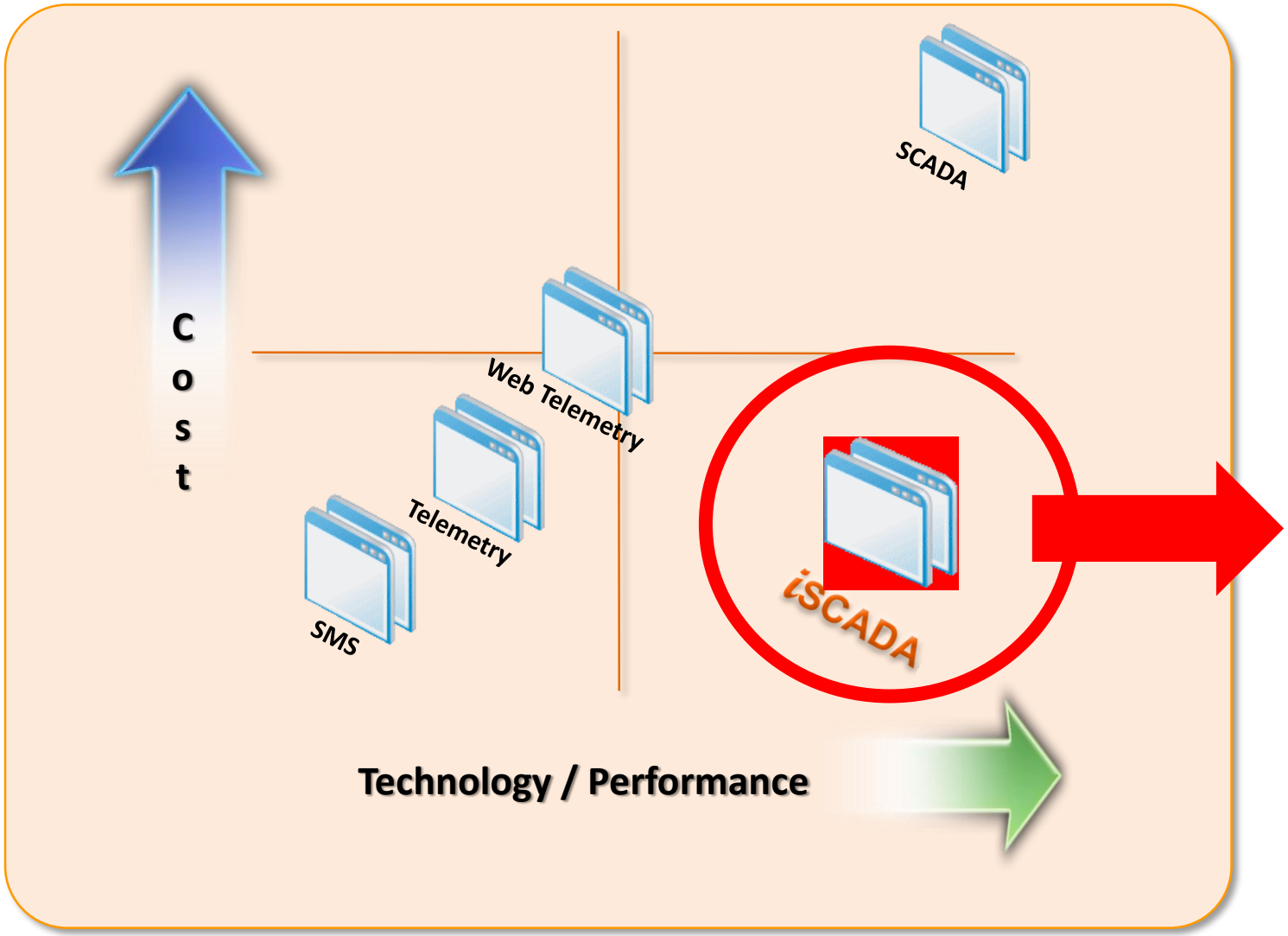
Product: Differentiation

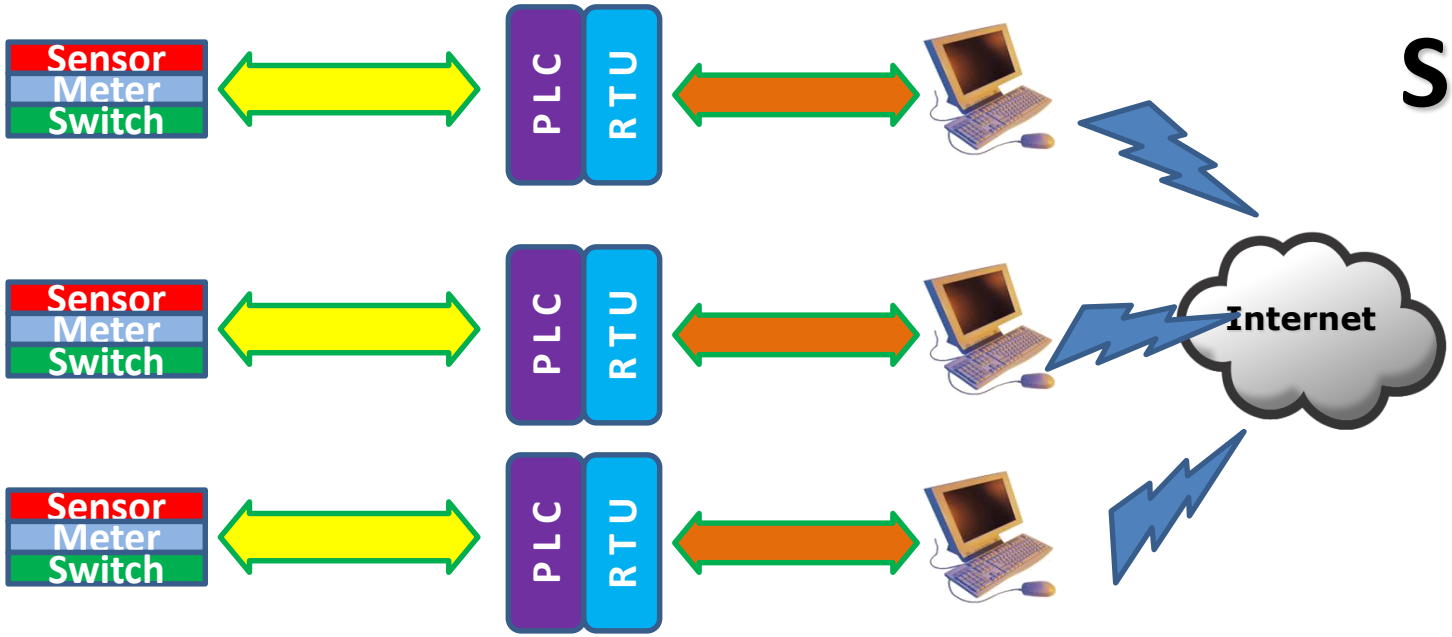
Connectivity Architectures

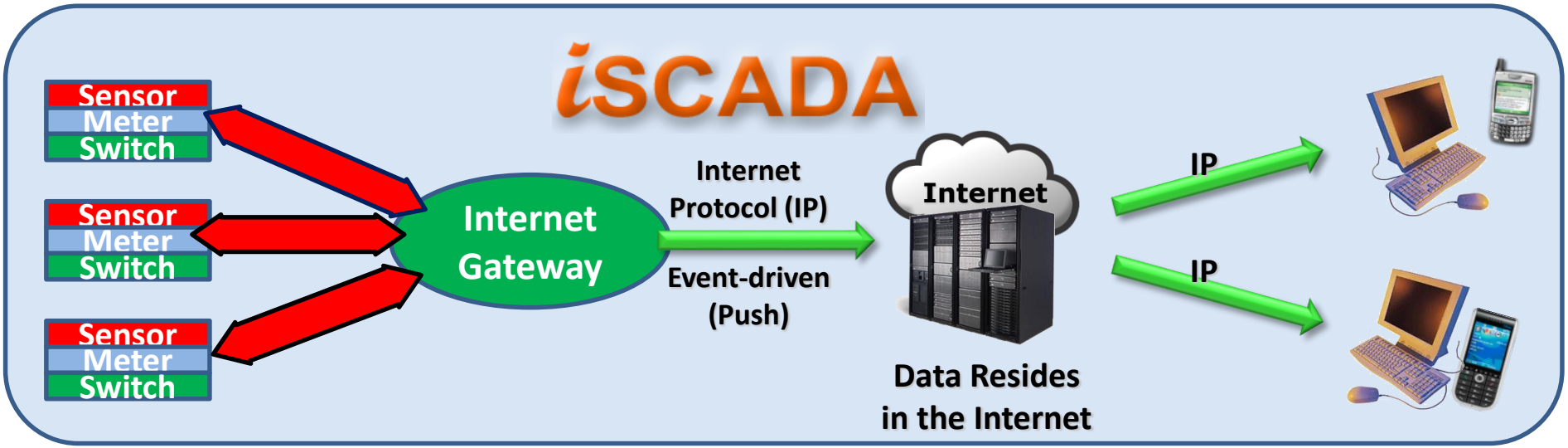


Product: Advantage

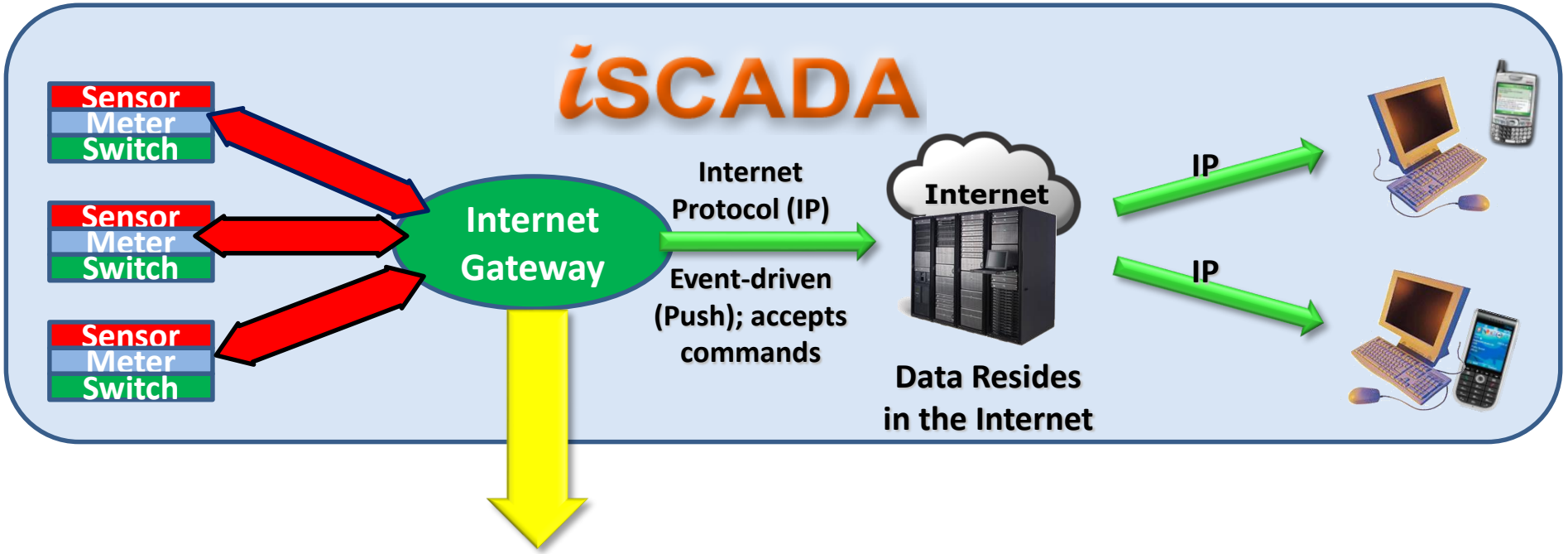
Lower Price/Higher Performance



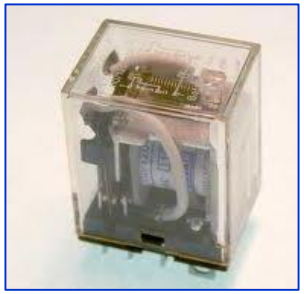

SCADA
Sensor
Meter
Switch
PLC
RTU
Sensor
Meter
Switch
PLC
RTU
Internet
Sensor
Meter
Switch
PLC
RTU


iSCADA
Sensor
Meter
Switch
Sensor
Meter
Switch
Sensor
Meter
Switch
Internet
Gateway
Internet
Protocol (IP)
Event-driven
(Push)
Internet
Data Resides
in the Internet
IP
IP

System Advantages



- Accepts data directly from device (sensor/switch/meters)
- Converts data into TCP-IP packet
- Secures data through encryption
- Transmits data into internet (via LAN, WAN, GPRS, etc.)
- Accepts user commands from user via internet link
- Executes command / provides feedback on execution
- 'Virtual' gateway can be configured to accept data directly from existing monitoring system (subject to development)



4 – 20 mA

0 to 5 V

Volt-Free Contact

ModBus Protocol

Pulse

iSCADA Panel (RTU)

Temperature & Humidity Sensor: 4-20mA

Magnetic Switch, Control Relays: Volt-Free Contact

Electrical Parameters: ModBus Protocol

Primary Connectivity: LAN

Protocol : TCP / IP

Back-Up Connectivity: GPRS

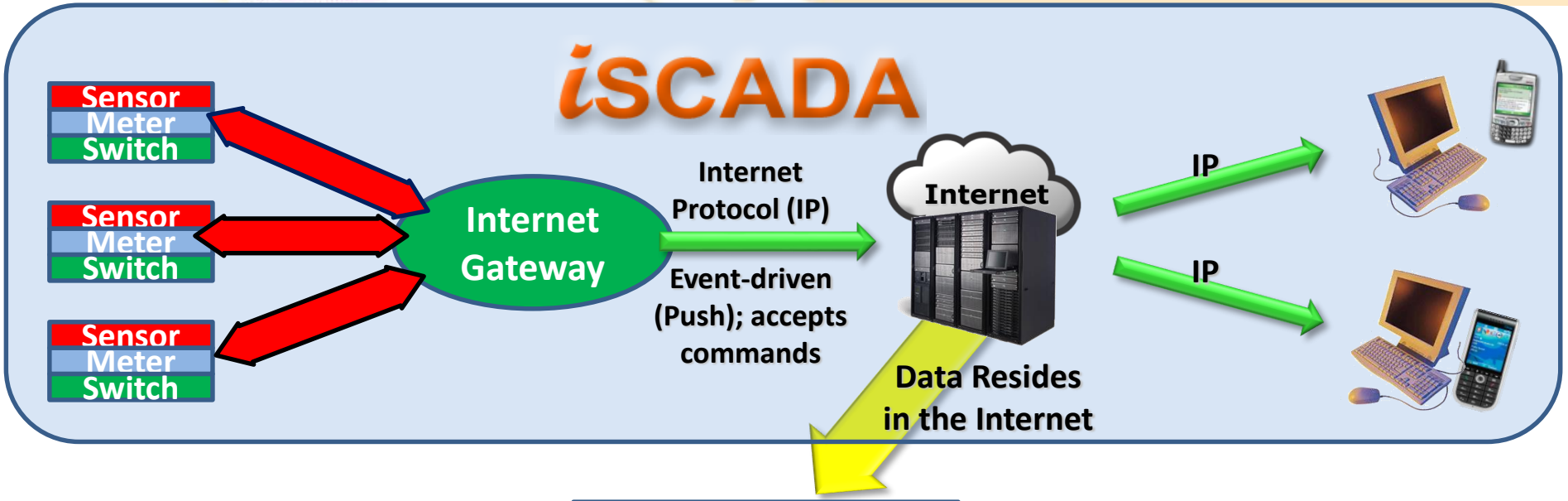
iSCADA Gateway (RTU)

iSCADA Server at Time (MTU)

The iSCADA system has a **auto-switch** over when the primary connectivity fails.

The system accepts any GPRS SIM Card and any TCP/IP LAN (RJ45) cables.

System Advantages



Gateway Interface

- Data collection from iSCADA Gateway or existing 3rd party monitoring system
- Gateway device and sensor/meter/switch management
- Encryption/decryption and data integrity check
- Device and sensor control

iSCADA Core Engine

Alert Management
- SMS and Email
- Recurrence/Escalation
- Scheduling

System Supervision

Data Hosting / Data Processing

User Interface

Data Control
- Custom Monitoring Panel
- Data Organisation/Processing
- Data Security – Login & Encryption

Monitoring Interface (KPI & Reports)

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Server Modules & User Interface

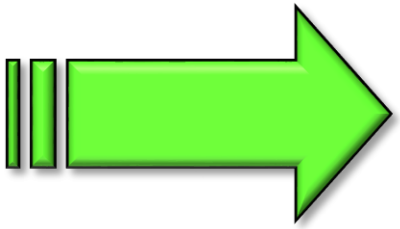
iSCADA Server

- Advanced multi BROWSER capability
- Protocol: TCP/IP
- Administration Module
- Monitoring Module
- Configuration
- Alerts
- Trending
- Reporting Module

User PC

iSCADA Server at Time (MTU)

ALERTS



ALERTS

E-Mail

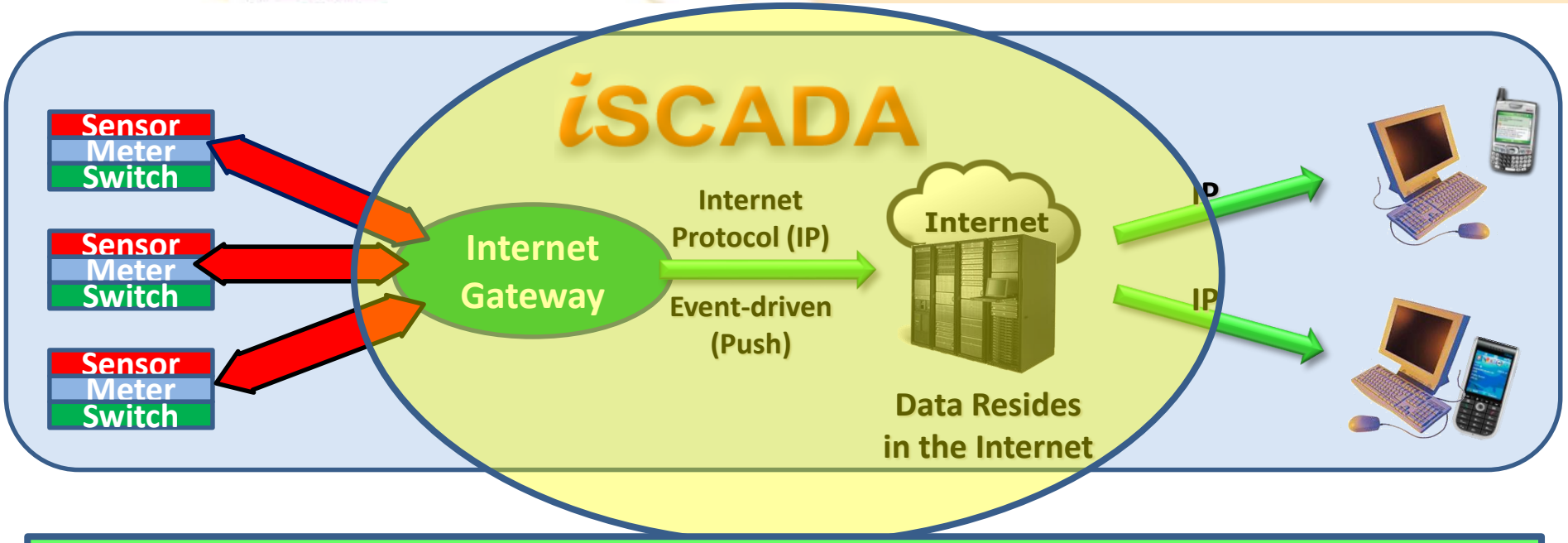
SMS

iSCADA Interface (Visual & Audio)

System Check Fail:

iSCADA Server is programmed to ensure that it hears from all iSCADA Gateways within a specified duration. This is regardless if there is new data or not. If it has failed for more than two of the programmed duration, the iSCADA Server will send out pre-programmed alerts.

System Advantages



- Mature and stable system (Launched in 2003 as complete end to end system)
- Widely deployed in many disparate usage environments
- Versatile, flexible and efficient in complementing existing SCADA systems
- Adaptable to meet disparate and diverse secure monitoring requirements
- Very cost effective as stand alone machine to machine monitoring and control solution
- Highly scalable to address data collection across multiple sites in geographically diverse locations
- Innovative Gateway-Server design engenders high data concurrency
- Very rapid implementation as server is already in place

This the Implementation of a complete Internet of Things(IoT) Solution using the iSCADA platform

Technology & Product Evolution

Server
Version 1

Gateway
1000 Series

2003

Server
Version 2

Gateway
2000 Series

2006

Server
Version 3

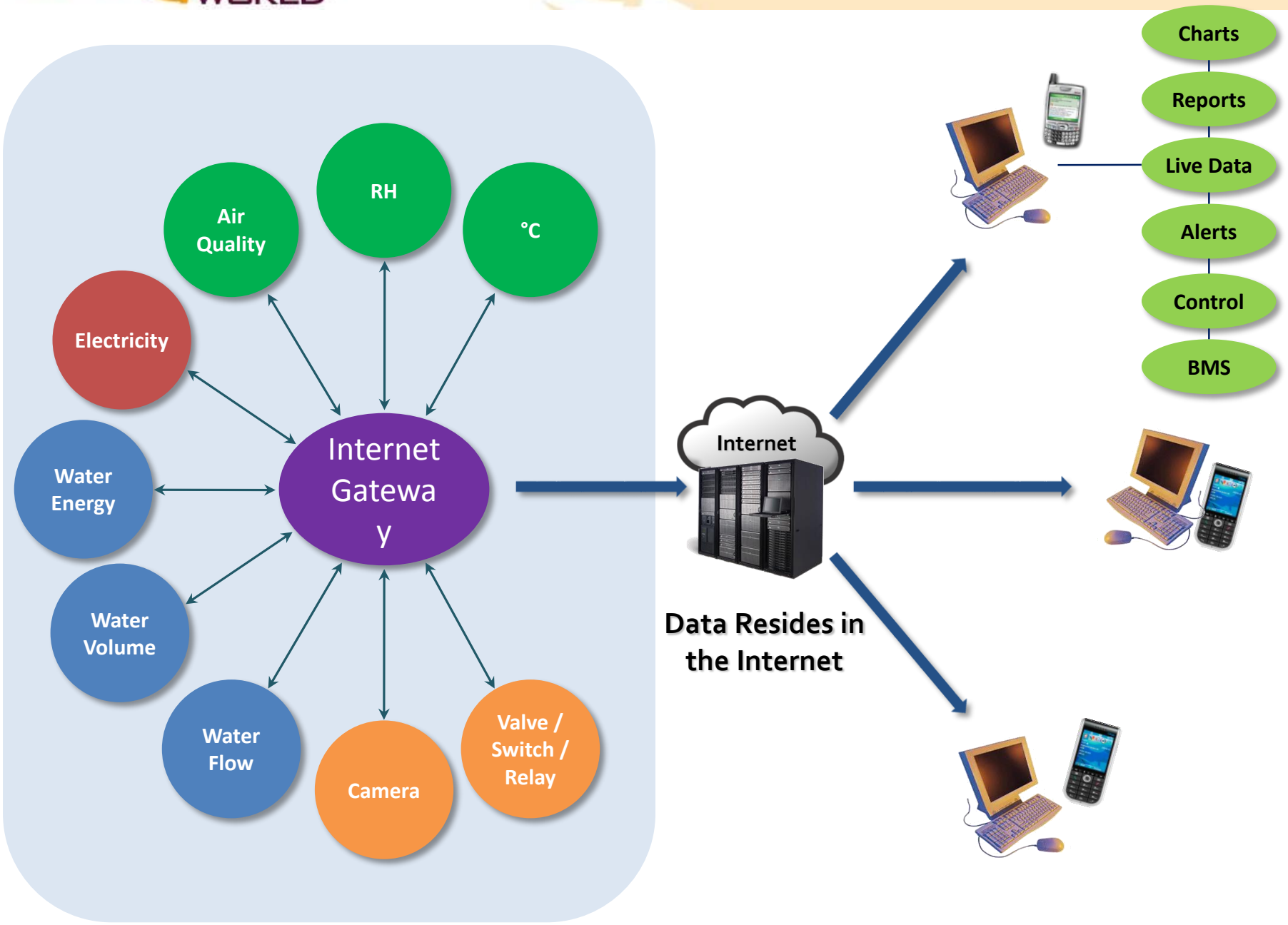
Gateway
3000 Series

Real time
processing
SW

2012

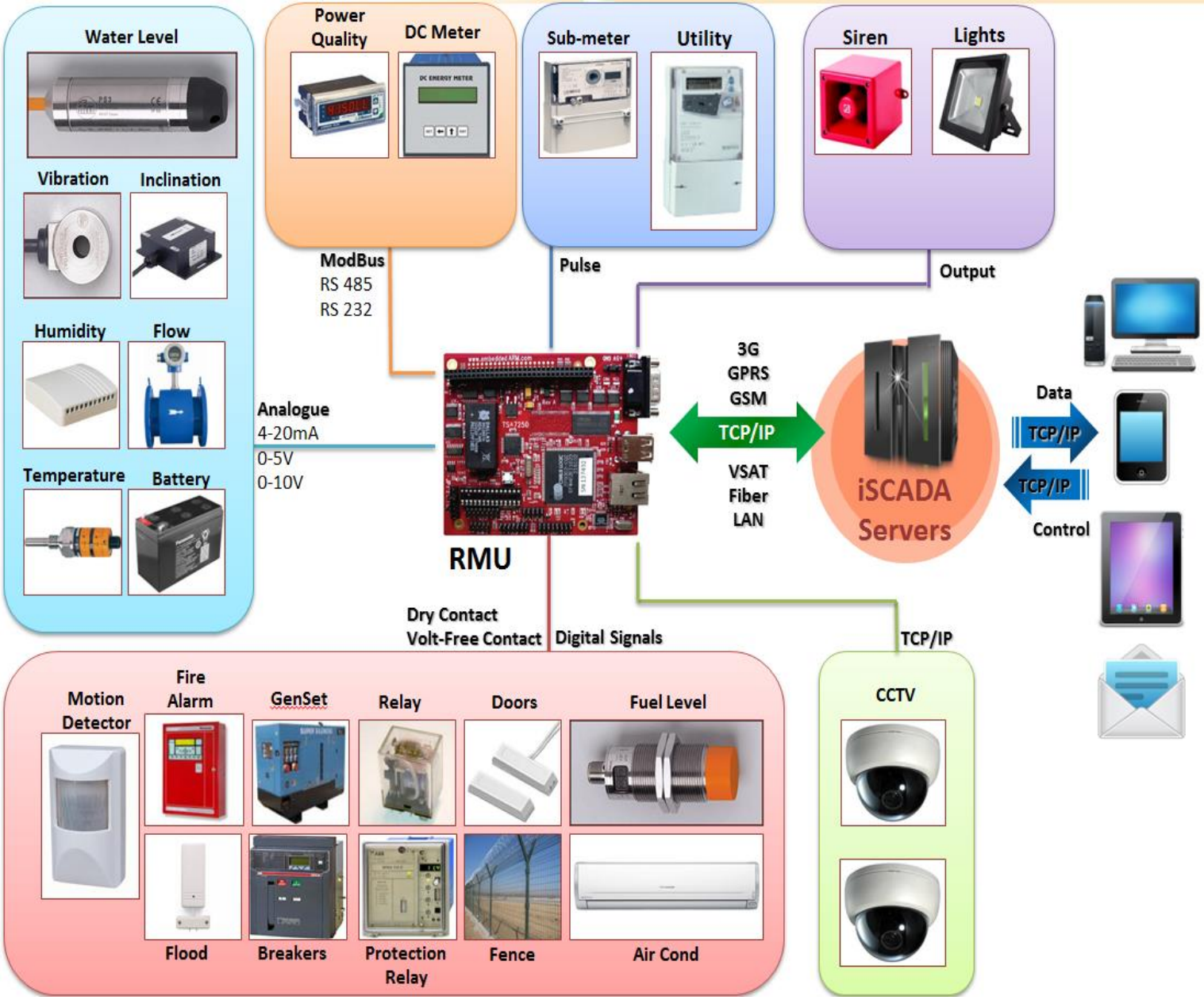
DEVICES WORLD

The iSCADA Technology Platform



DEVICES WORLD

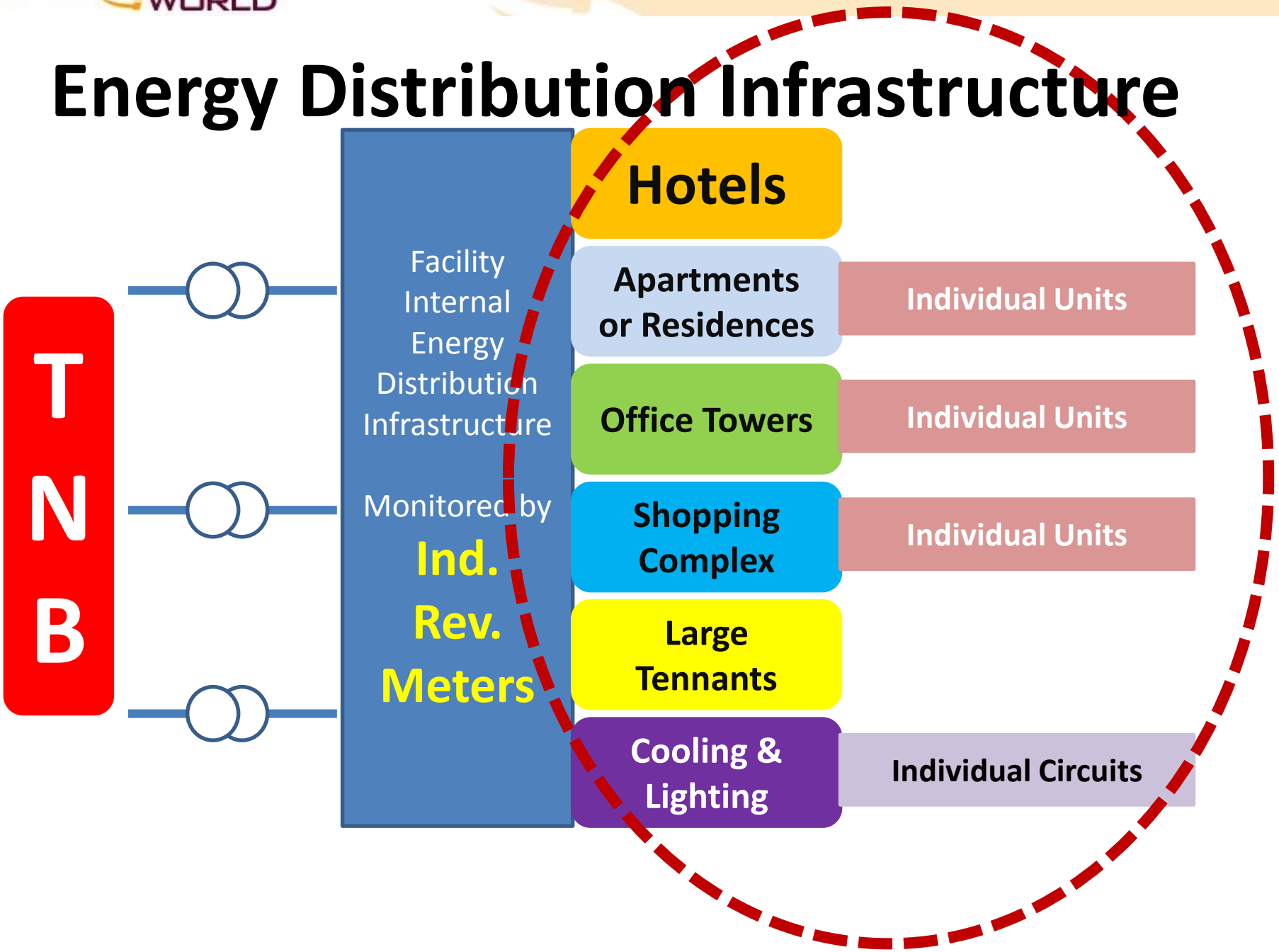
The iSCADA Technology Platform

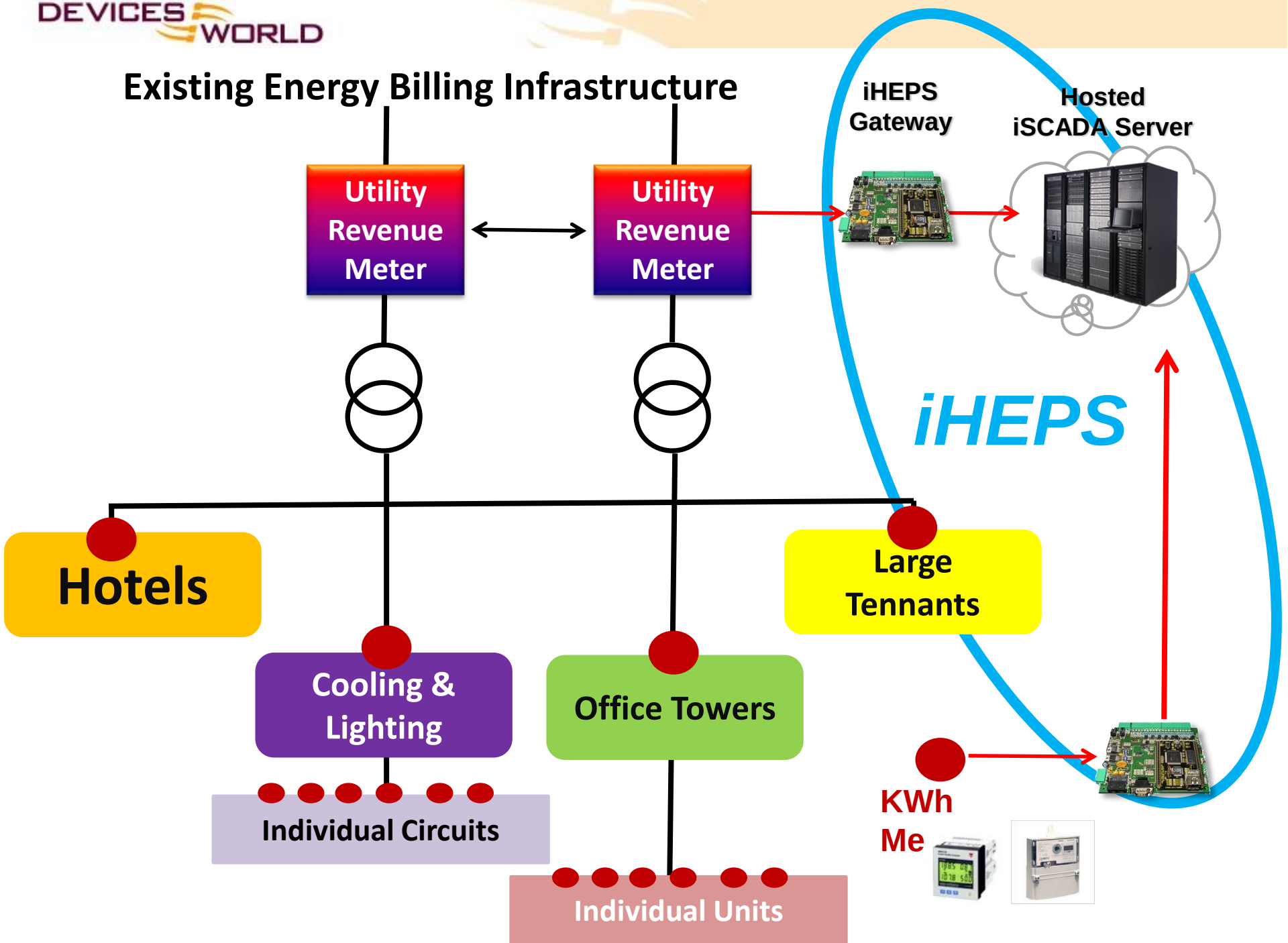


Energy Monitoring

Efficiency, Cost Mitigation, Max. Demand & Automated Billing Technology

Energy Distribution Infrastructure




Existing Energy Billing Infrastructure
Utility Revenue Meter
Utility Revenue Meter
iHEPS Gateway
Hosted iSCADA Server
iHEPS
Hotels
Large Tennants
Cooling & Lighting
Office Towers
Individual Circuits
Individual Units
KWh Me

DEVICES WORLD

iSCADA (iHEPS) Gateway installed and connected to TNB revenue (KWh) meters (no supply interruption)

Data collection/presentation from existing utility meters using iSCADA Technology

Universal access

User's PC

iSCADA Server

10-Level Escalating Alerts

LAN, WAN, PSTN, GSM, GPRS, Radio, ACeS, or VSAT

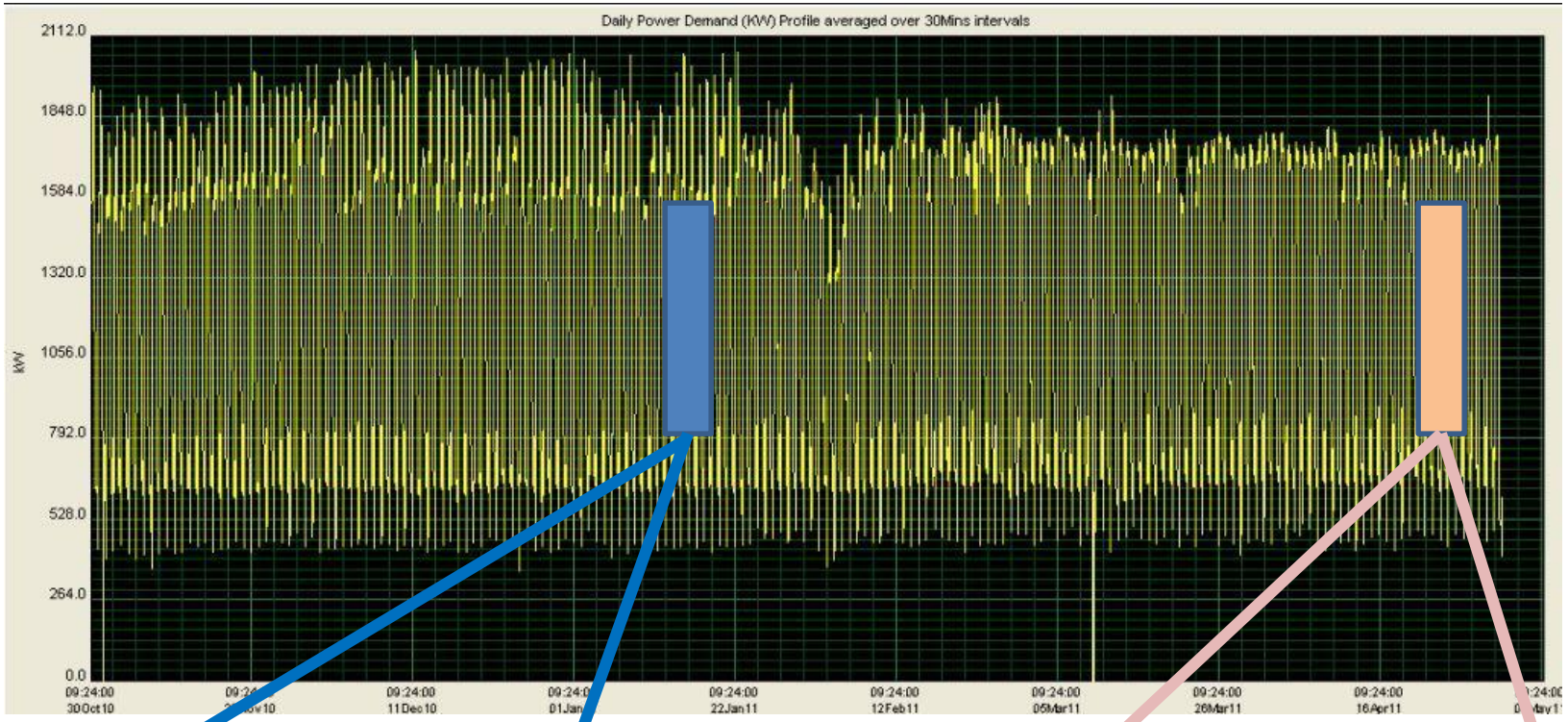
Gateway

Site 1 : Energy Meters (Utility)

Gateway

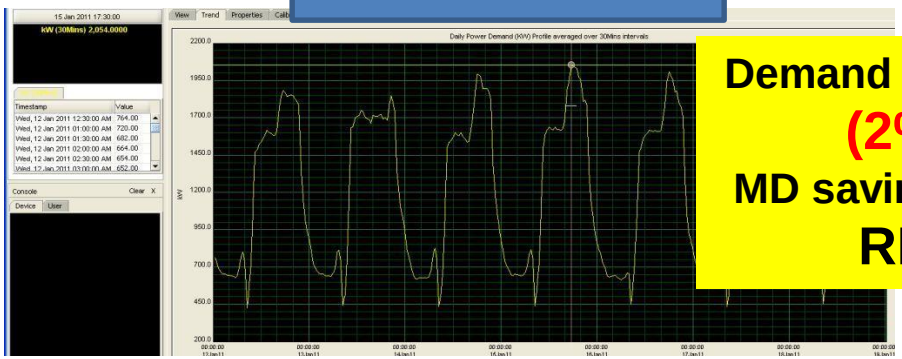
Site 2: Energy Meters (Utility)

BV2 Demand Profile (Nov 2010 to April 2011)



Demand Profile Jan 12 to 19 2011

Demand Profile April 20 to 27 2011



Demand reduced by 252 KW

(2% Savings)

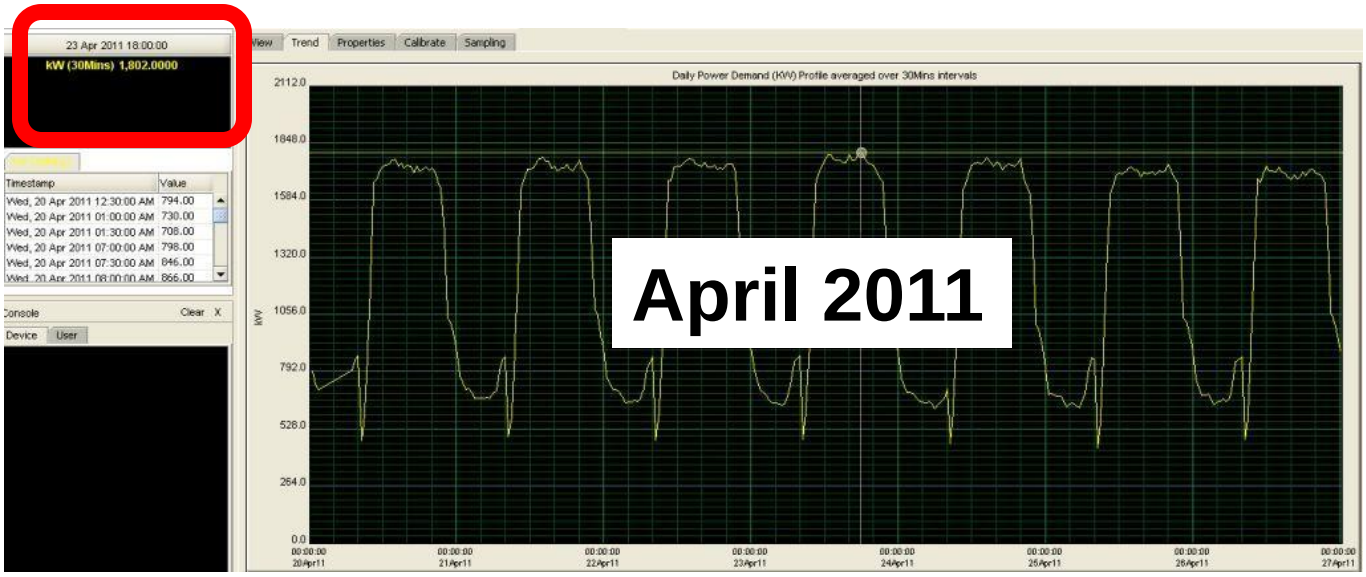
MD savings of (252 x 23.93)

RM 6,030.36

BV2 Max. Demand Profile (Jan & April 2011)

2054 KW

Demand reduced by 252 KW
Net savings of (252 x 23.93) RM6,030.36



1802 KW

Fire Safety

Remote Alerts & Failure Detection

Safety - Fire Alarms

Fire Alarm Panels

FIRE ALARM PANEL

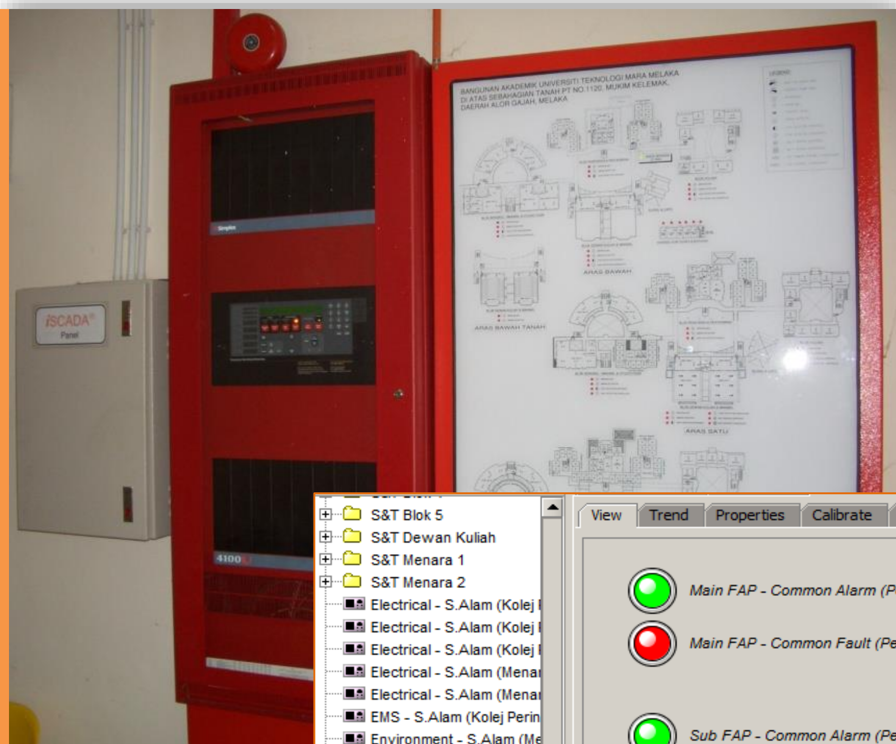
- AC Fail
- Charger Fail
- Common Fault
- Bell Fault
- Zone Fault
- Common Alarm

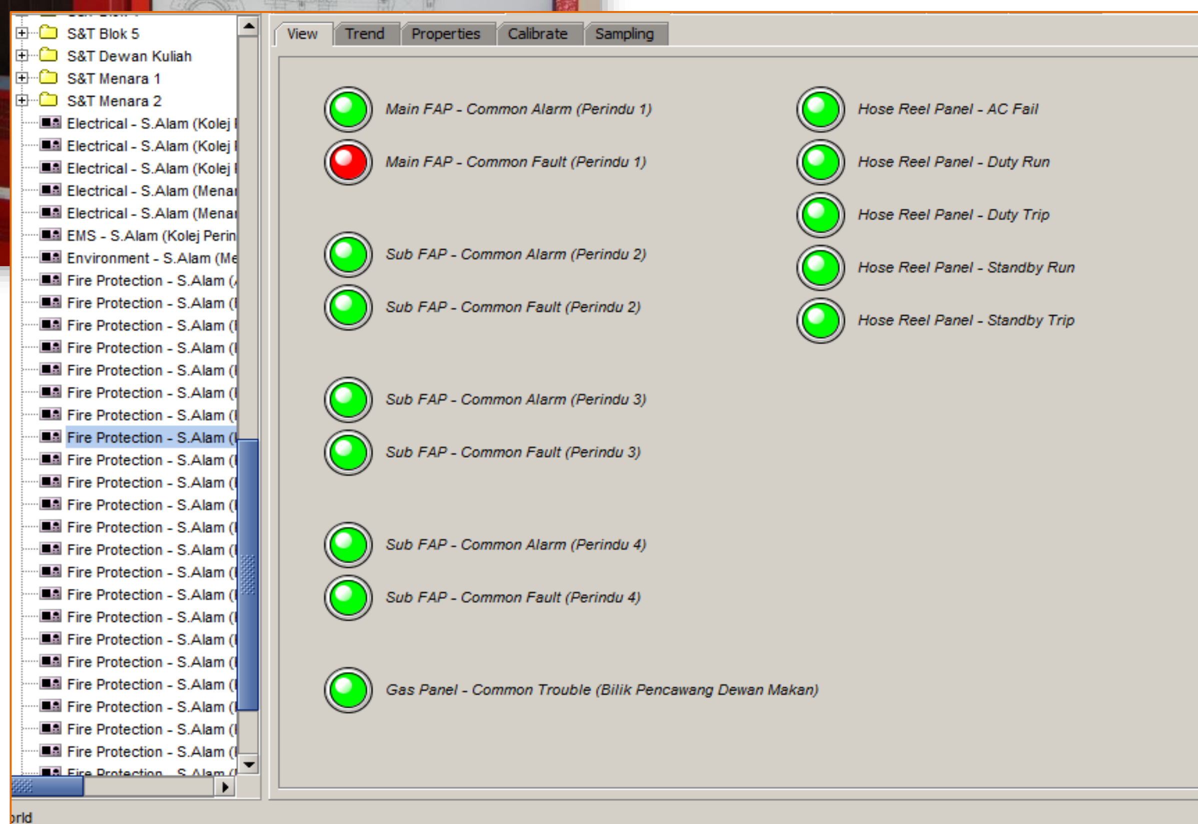
HOSE REEL

SPRINKLER

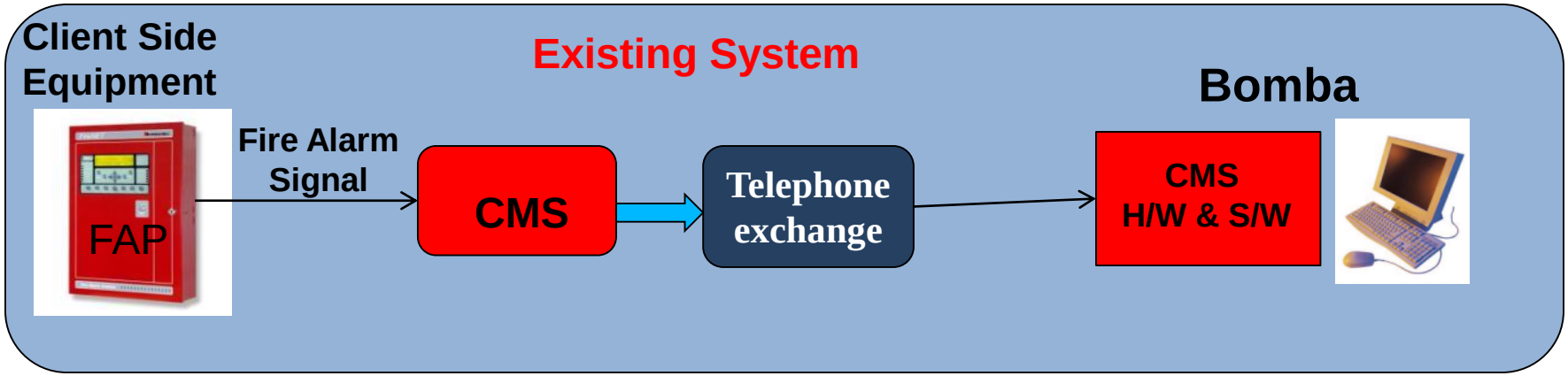
HYDRANT

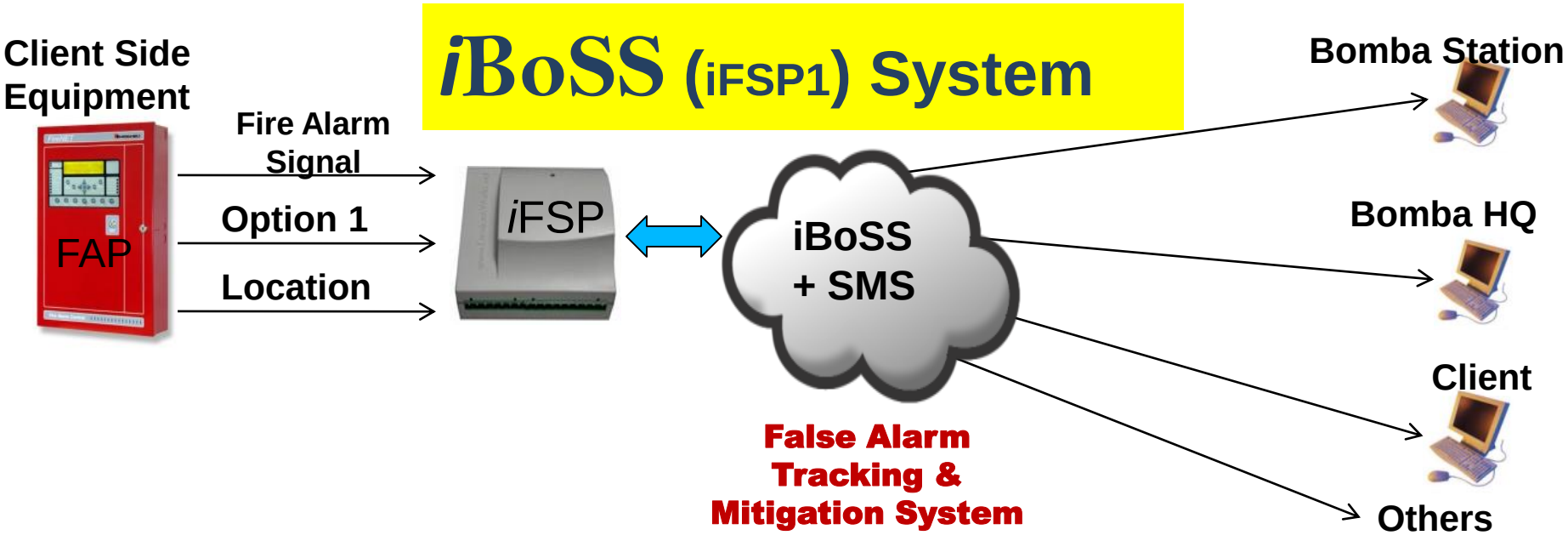
CO_2 System





Fire Safety – National Fire Alarm Monitoring iBoSS Solution





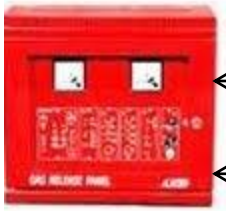
*i*BoSS Level 2 System

Client Side Equipment

Fire Alarm Signal

Option 1

Option 2



Sub Panels : Gas

Sprinkler, Pumps

Environment

Water Levels

iFSP$_2$

Server Side

iBoSS
+ SMS

User Side Equipment

Bomba Station

Bomba HQ

Client

Others

Two ways communication

iBoSS Level 3 System

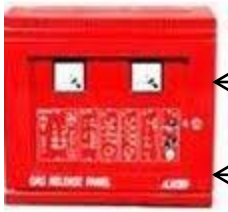
Client Side Equipment – Real time addressable FAP

iFSP3

Fire Alarm Signal

Option 1

Option 2



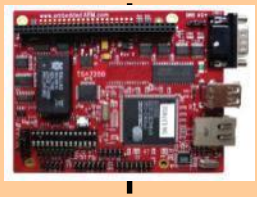
Sub Panels : Gas

Sprinkler, Pumps

Future Apps.

Water Levels

Energy Efficiency



Server Side

iBoSS + SMS

User Side Equipment

Bomba Station

Bomba HQ

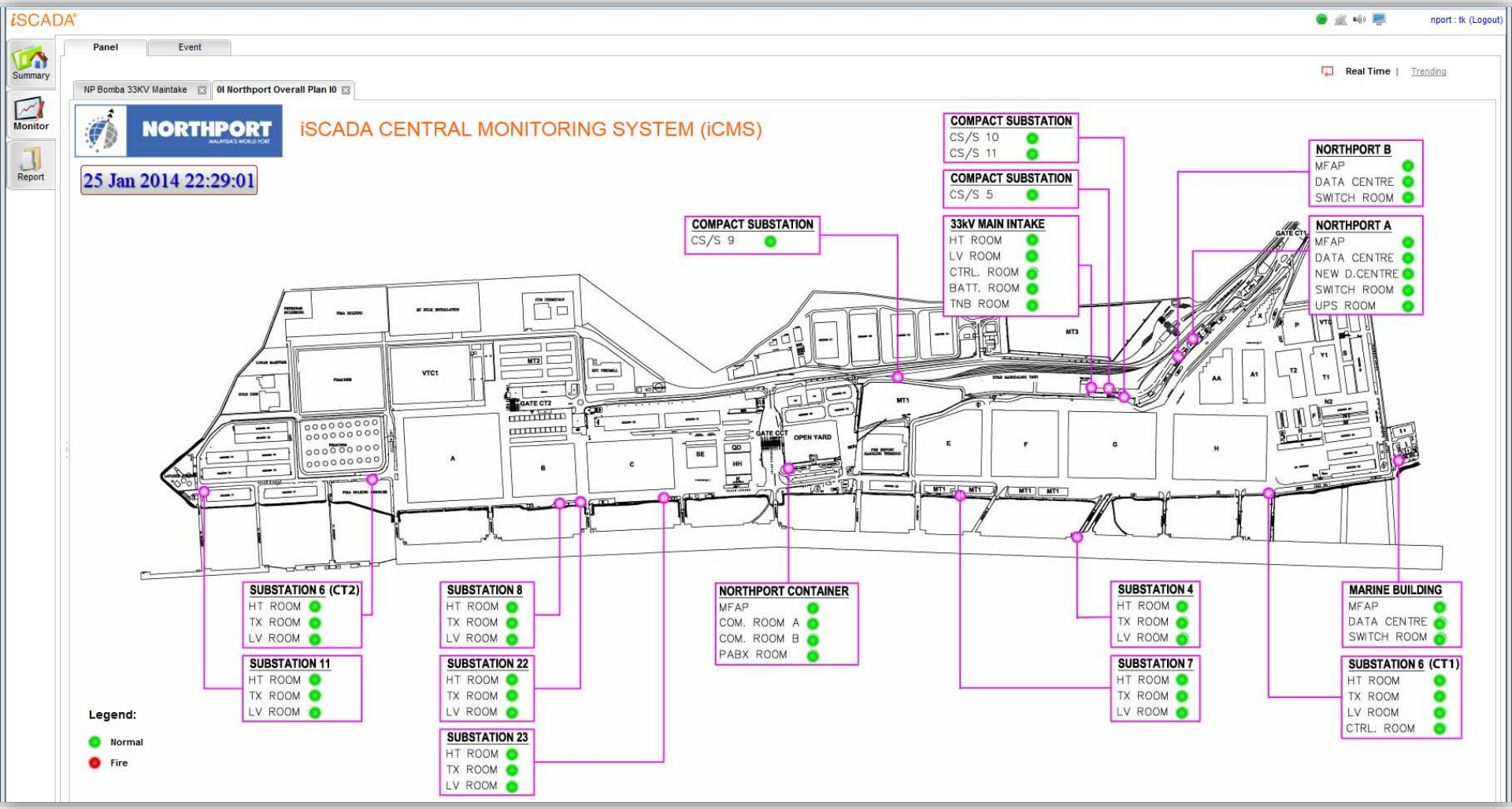
Client

Others

DEVICES WORLD

Safety - Fire Alarm Panels

Consolidated View

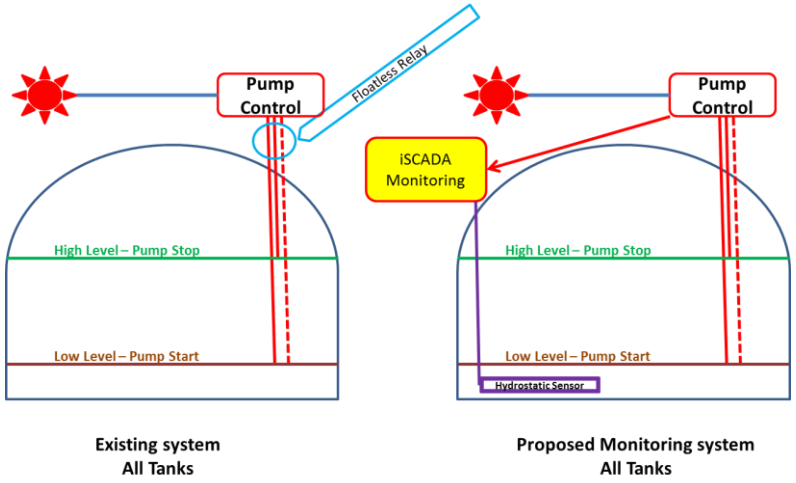


Water Supply Monitoring

&

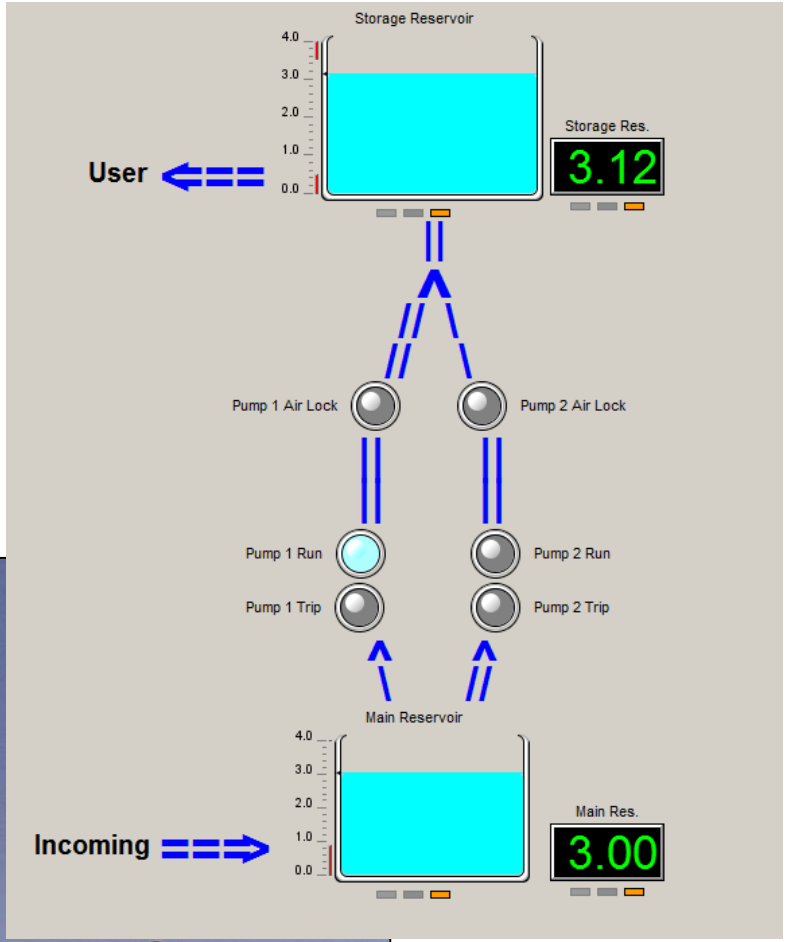
Other applications

eMaintenance - Water Reticulation



Existing system
All Tanks

Proposed Monitoring system
All Tanks



WATER RETICULATION

PUMP PANEL
GROUND TANK
SUCTION TANK

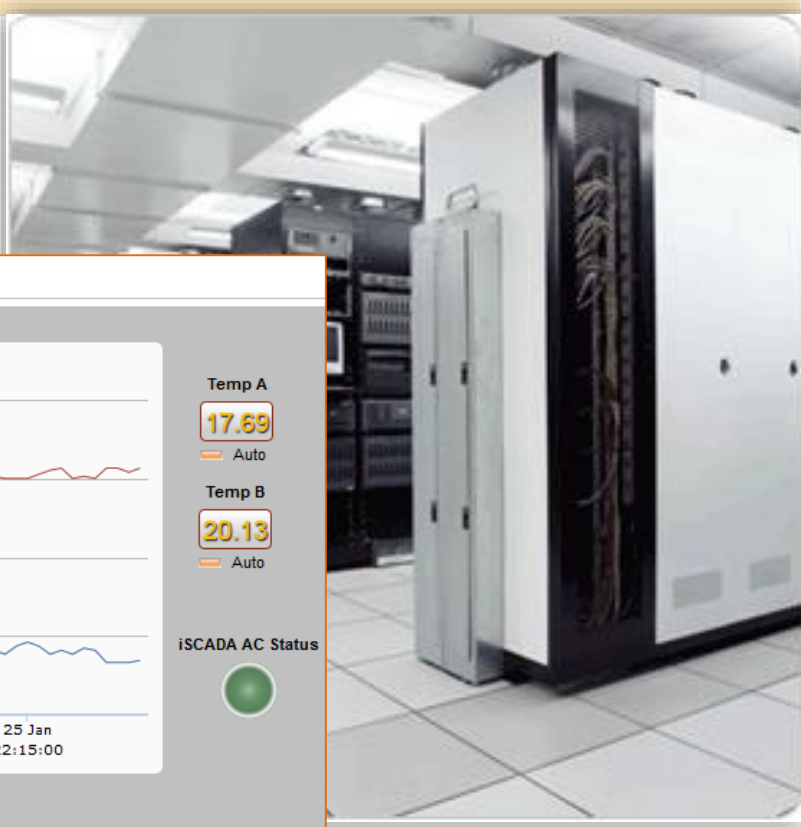
AC Fail
Pump Trip
Pump Run
Water Level
Over flow
Flow-rate

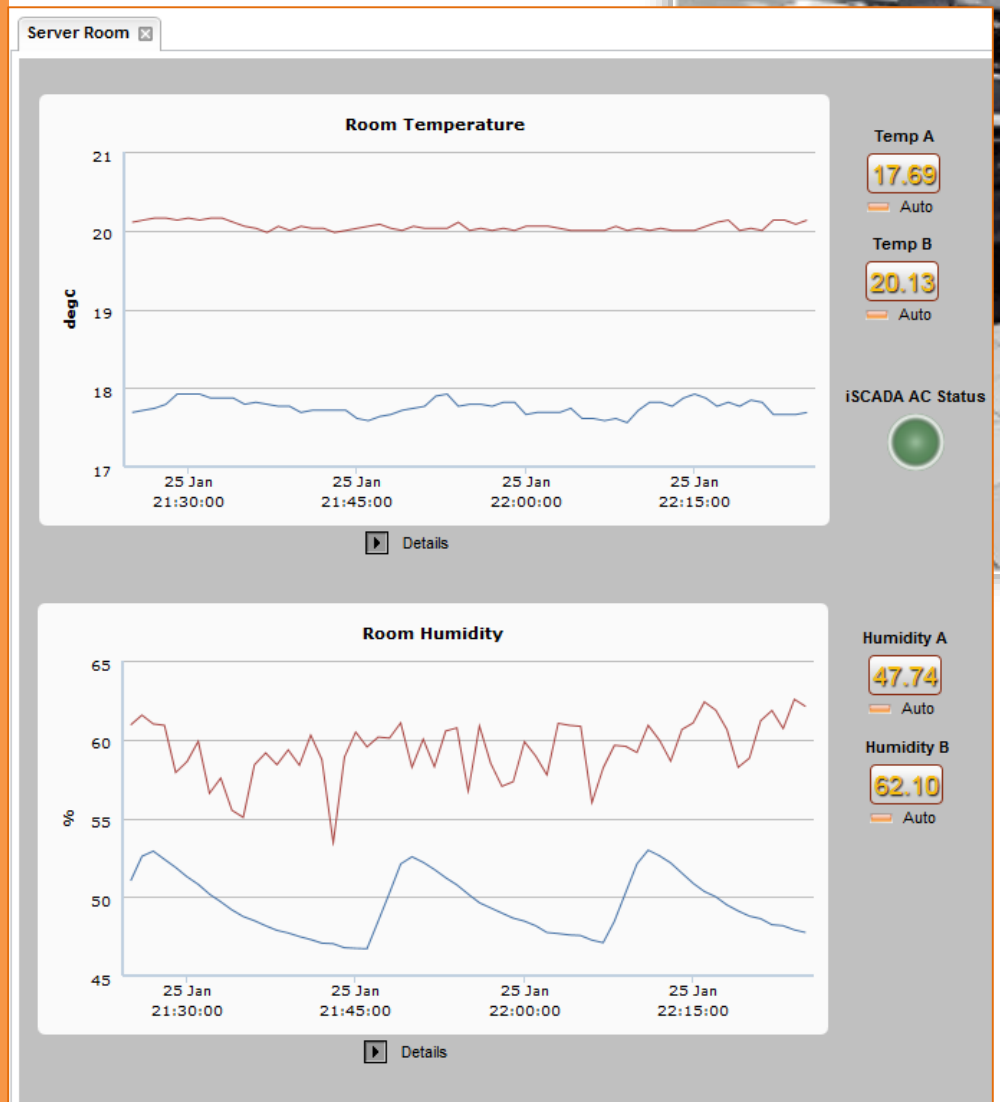
eMaintenance - Server Rooms

SERVER ROOMS

DATA CENTRE
- Temperature
- Humidity
- AC Fail
- Door Open
- kWh Metering

PRECISSION AIR-COND
- Run / Stop
- Trip



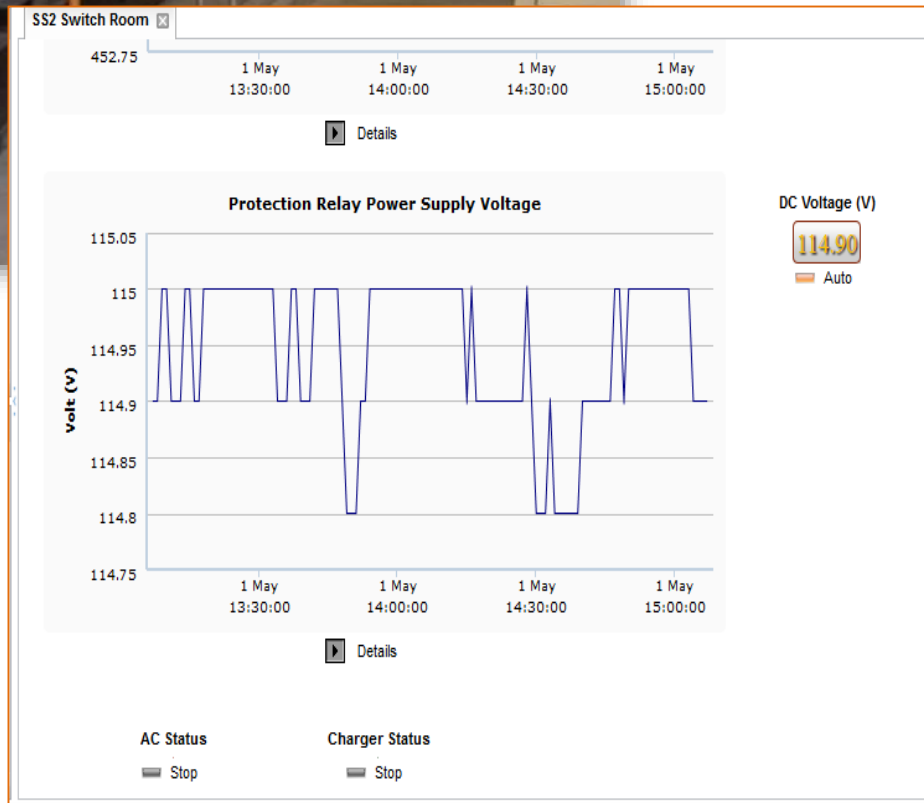


eMaintenance - Generators, UPS

GENERATOR & UPS

GENERATOR
- Run / Stop
- Battery Fail
- Over-speed
- Oil Pressure
- High Temp
- Overload
- Trip

UPS
- Mains Fail
- Battery Fault
- Overload
- Fault
- Alarm
- Battery Low

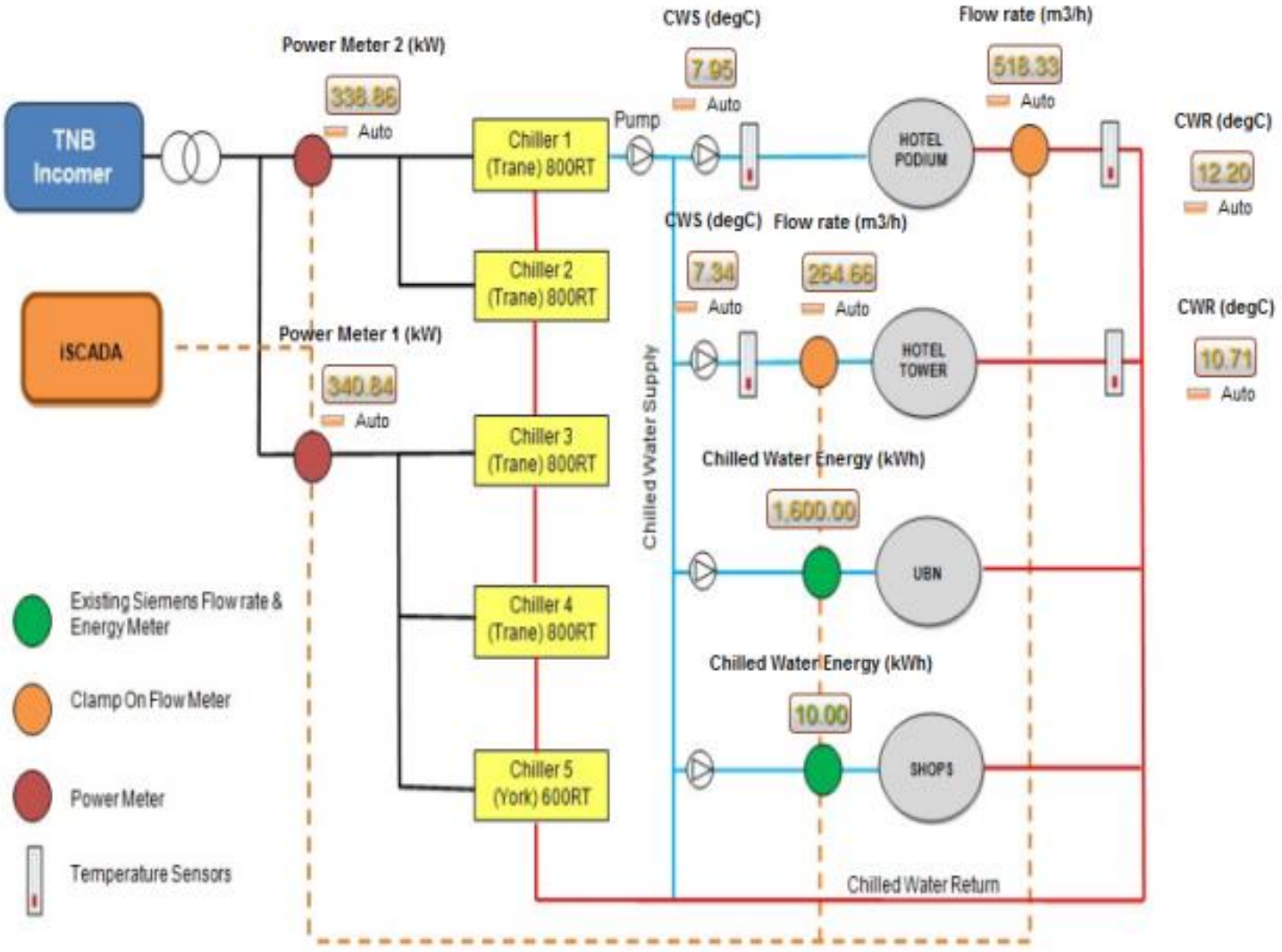


DEVICES WORLD

Chiller Monitoring (Hydronics)

CHILLER SYSTEM

- Flow-rate
- Temperature
- Thermal Energy
- Chiller Energy
- Chiller Efficiency
- Phase Current
- Voltages



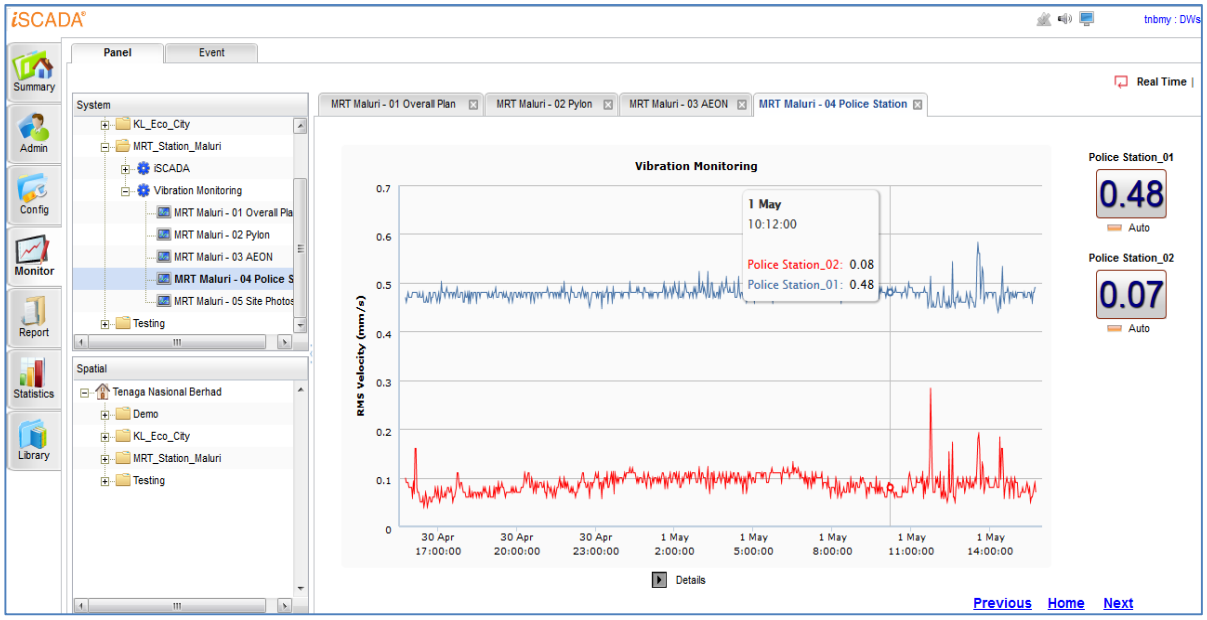
Vibration

iSCADA Main Panel at Pylon Side

iSCADA Main Panel at AEON Side

iSCADA Main Panel at Police Station Side

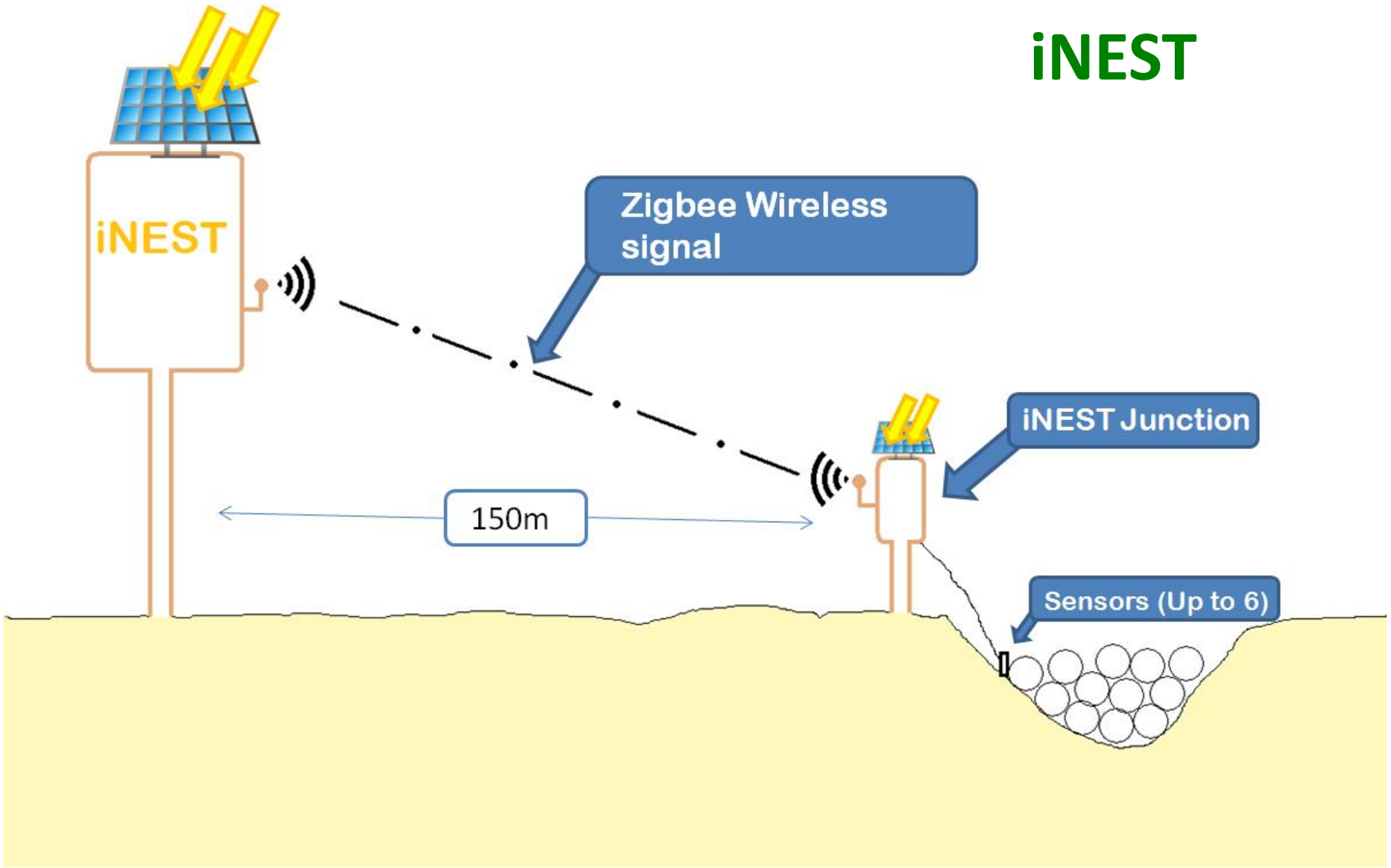
Vibration Sensor Box in a Manhole

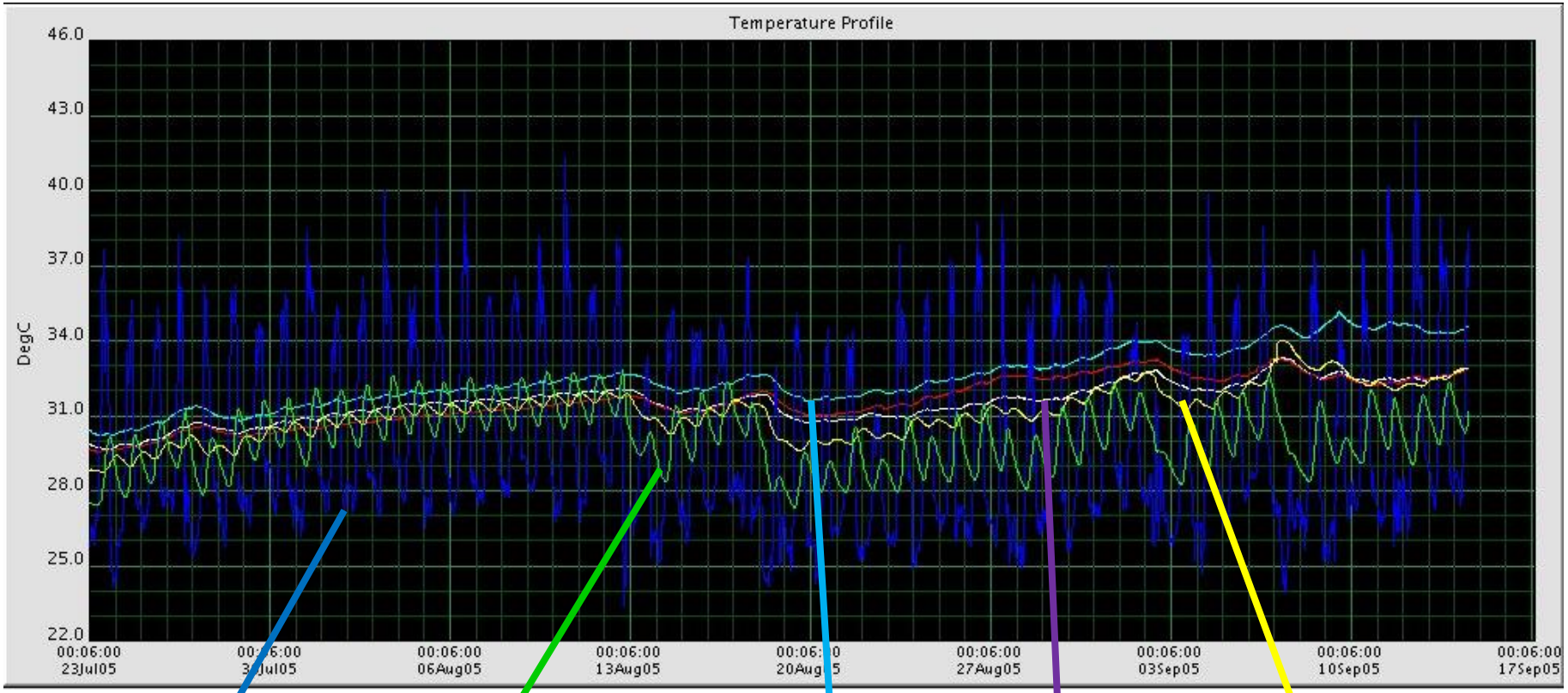


iNEST

Chagar Hutang – Protected Turtle nesting site

iNEST


iNEST
Zigbee Wireless signal
iNEST Junction
150m
Sensors (Up to 6)



Sand Temperature

10 cm. above nest top

Nest top

Nest center

Nest bottom

iNEST Components :

Junction

Master

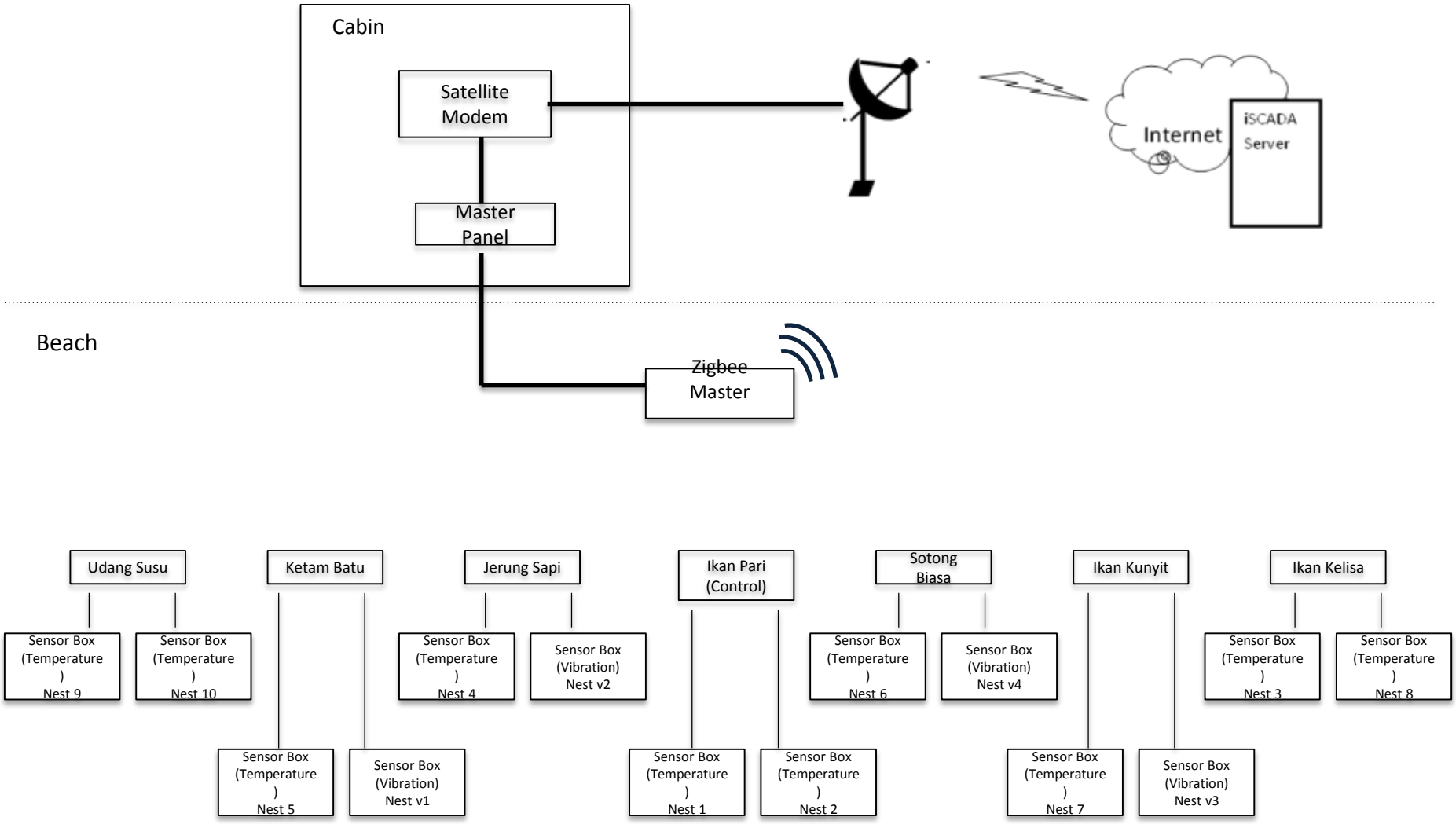
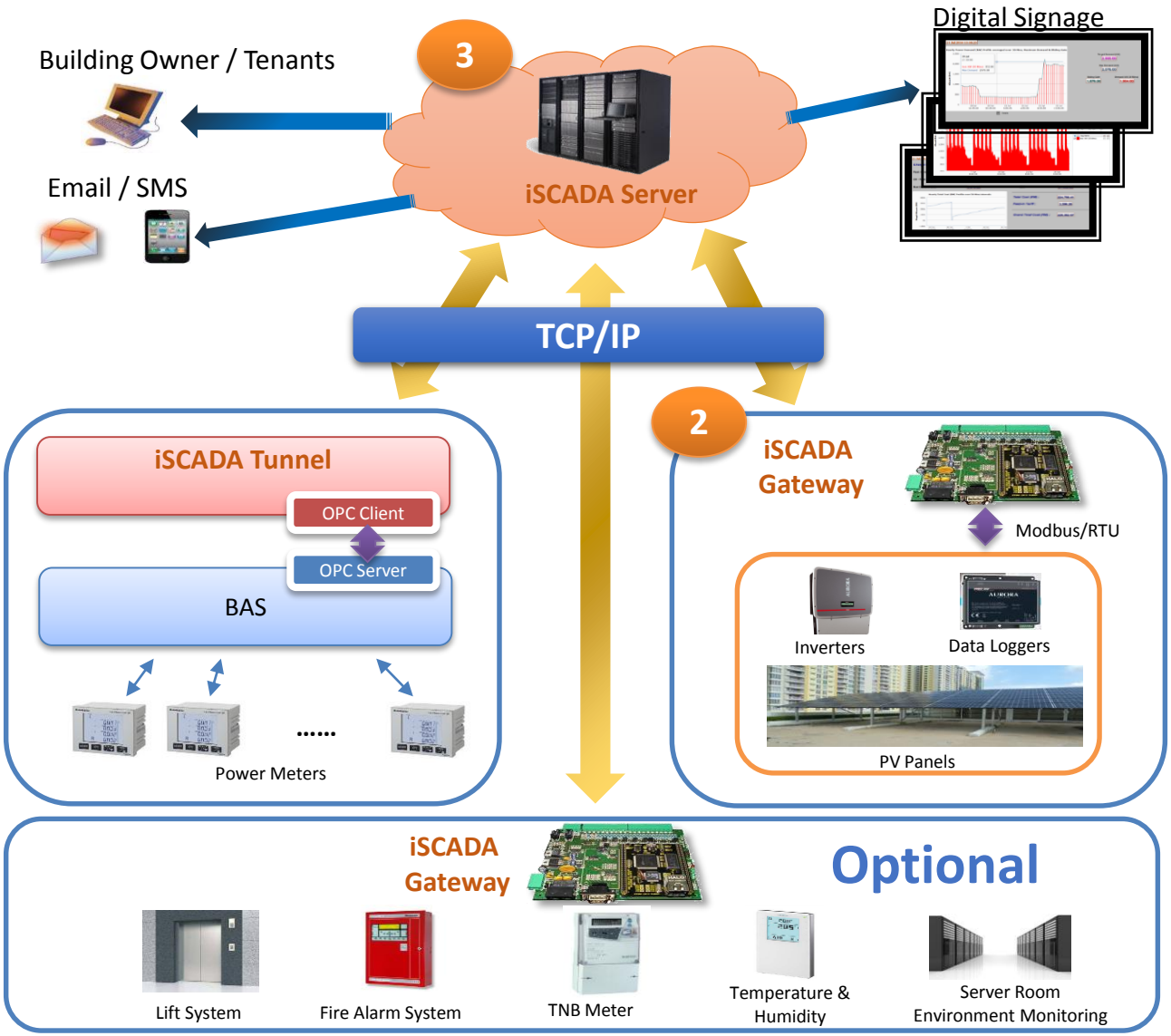


Figure 20: Architecture of the final iNEST system as of August 2014 for period 3

The PANASONIC ECO Visualisation overall architecture



Panasonic

*i*SCADA facility operations **solution**

- TNB revenue meter **- iHEPS**;
- tenant meters - **iTEMS**;
  - Can work with any meters with pulse output; or with ModBus communications.
  - Ability to detect malfunctioning meters
  - Tenants can login to view their own data, on a real-time basis. This is to prevent bill disputes.
- chiller system monitoring/operations evaluation - **iHVAC**
- temperature and humidity of Mall
- Water (cost allocation); gas billing - **iTEMS**
- Water Reticulation system (pump status: run / stop / trip, water levels, flow rates) – **iH2O**
- Fire safety (direct connection to BOMBA) - **iBoSS**
- Server Room

Questions & Clarifications