



Remote Operation of Wastewater Treatment Facilities

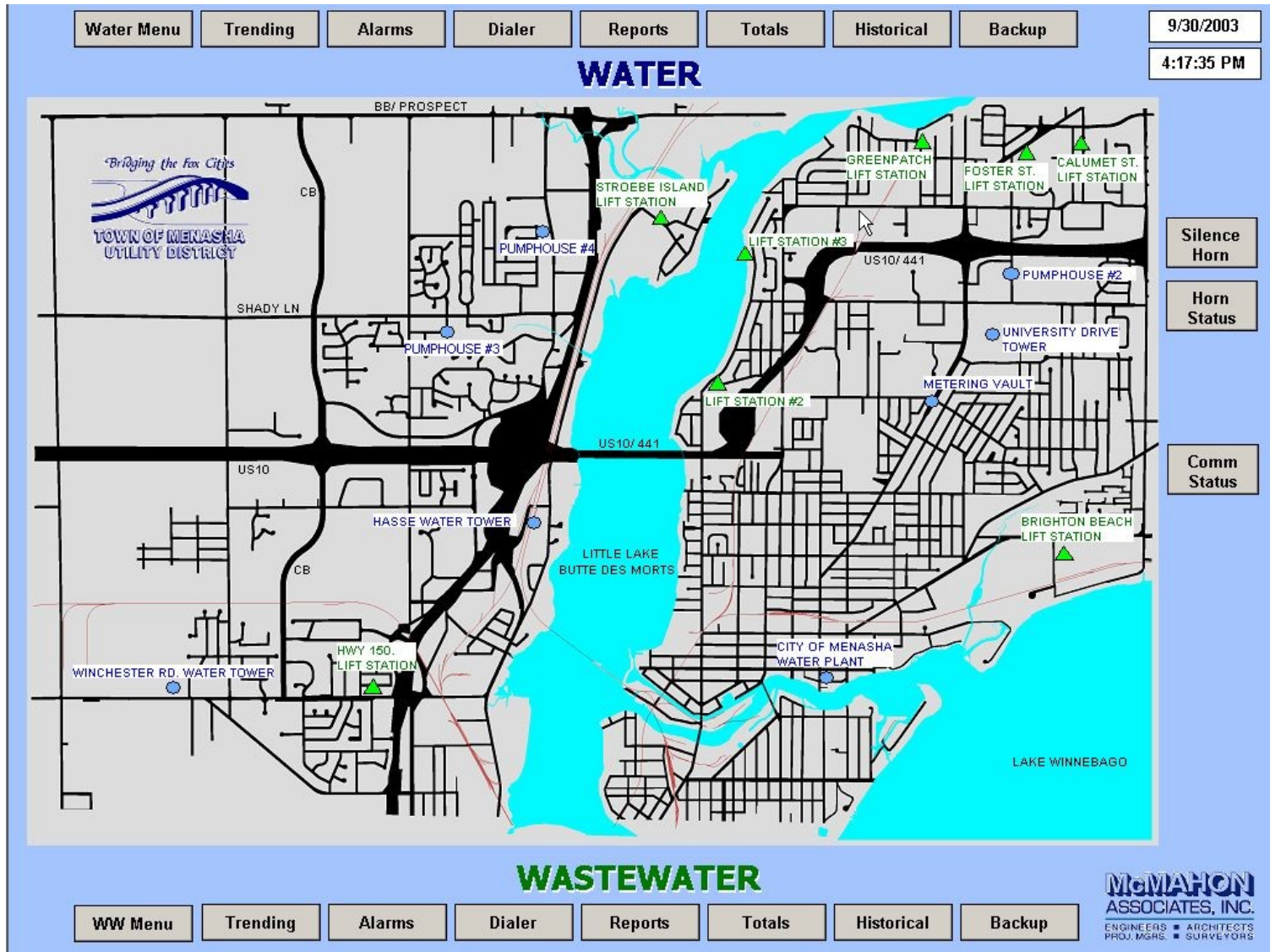
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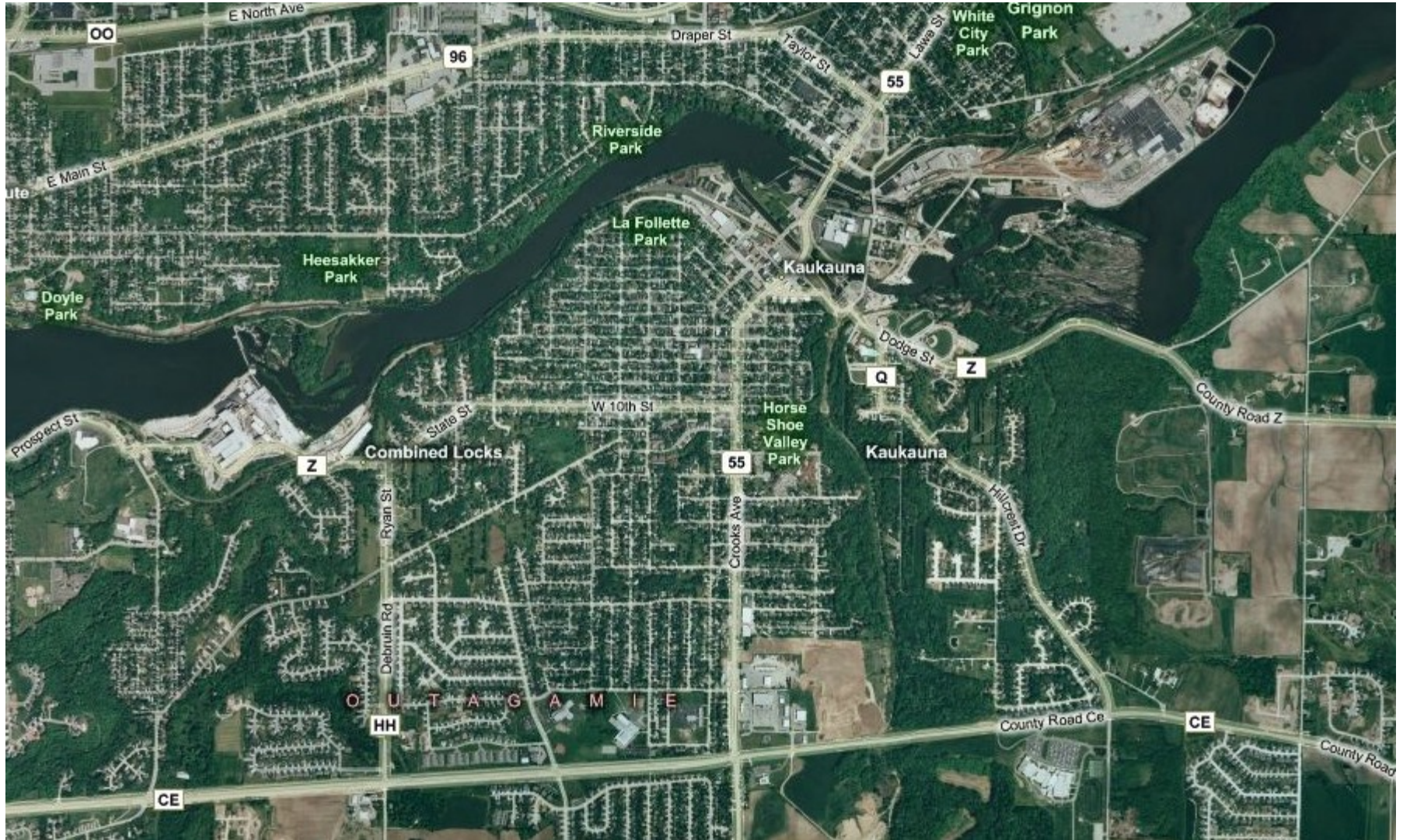
On-site Plant Operations



Remote sites are typically controlled and monitored from the main plant...



Operations Staff may be across town...



Or across country...



Wastewater Treatment Fundamental Information Needed for Operations

Key Flows



Wastewater Treatment Fundamental Information Needed for Operations

Wet Well Levels



Wastewater Treatment Fundamental Information Needed for Operations

Instrument Readings



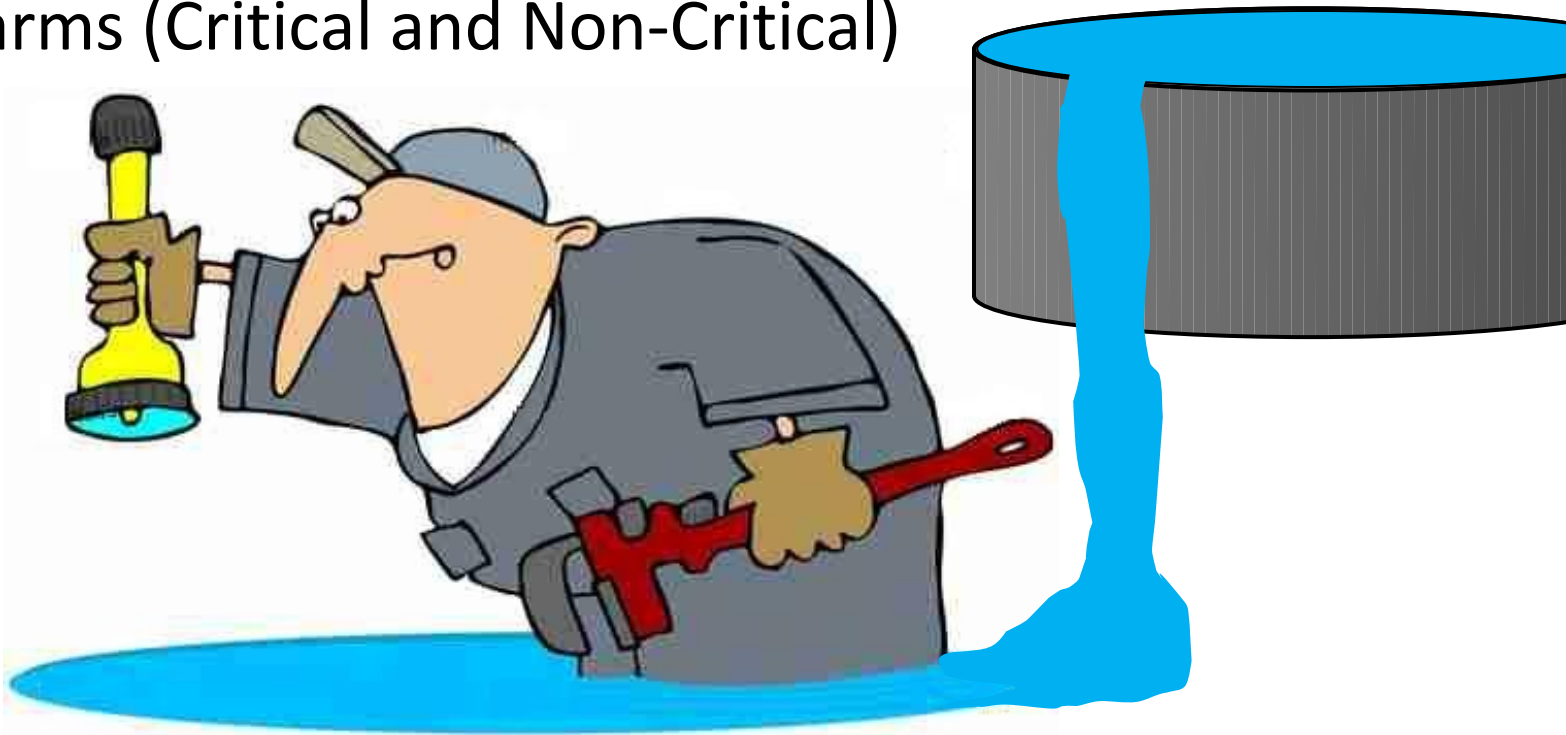
Wastewater Treatment Fundamental Information Needed for Operations

Pump Status



Wastewater Treatment Fundamental Information Needed for Operations

Alarms (Critical and Non-Critical)



Operator Interface is typically provided through a SCADA System

Menu Logon / Logoff
WASTEWATER HEADWORKS
2/25/2003
10:38:34 AM

Screw Pump #1 **Screw Pump #2** **Screw Pump #3**

RUNNING

AUTO

LEAD LAG 1 LAG 2

LEAD LAG 1 LAG 2

LEAD LAG 1 LAG 2

START **STOP**

ETM ##### hrs.

Lag 1 Setpoints

Start ###.## ft.

Stop ###.## ft.

Lag 2 Setpoints

Start ###.## ft.

Stop ###.## ft.

Lube Pump #1 **Lube Pump #2** **Lube Pump #3**

RUNNING

AUTO

ETM ##### hrs.

Headworks Effluent →

Trend Chart

H2S

Level ### ppm

Wetwell

Level ###.## ft.

High Alarm ###.## ft.

Wetwell Level Control

AUTO

PUSH TO CHANGE

Headworks Alarm Dial-out

Silence Horn

Alarm Summary

Acknowledge All

Disable Horn

Headworks - Alarm Summary

	Ack	Date In	Time In	Value	Description
1					
2					
3					
4					
5					
6					

Development of Remote Operation

On-Site Horn Alarm

Red Light on top of the Lift Station

Dialer – calls operator at home

Dialer – calls operator pager

Dialer – calls cell phone

Software-based Alarm Management

- Calls any phone number
- Prioritized and scheduled numbers
- Send an e-mail or text message to a smart device

Up until now, these technologies focused on alarms, without regard to plant status, or operation.

What About Remote Operation?

Remote Operation:

The ability to monitor or control plant processes from a location some distance away from the plant.

- At another affiliated facility
- On the road
- At home
- Across country

Two Kinds of Remote Control

Monitor Only

- Provides a window into the plant, but does not permit operation of pumps, or changing plant parameters.
Look, but Don't Touch.

Monitor and Control

- Provides full access to not only monitor the plant status, but also allows the remote operator to turn pumps on and off, change setpoints, etc.

Monitor Only Remote Operation

PC-based SCADA system at the plant

“View” software installed on the plant computer

Plant computer needs Internet access

Any remote computer with Internet access can
“log-in” to view the SCADA screens

Monitor Only Remote Operation (continued)

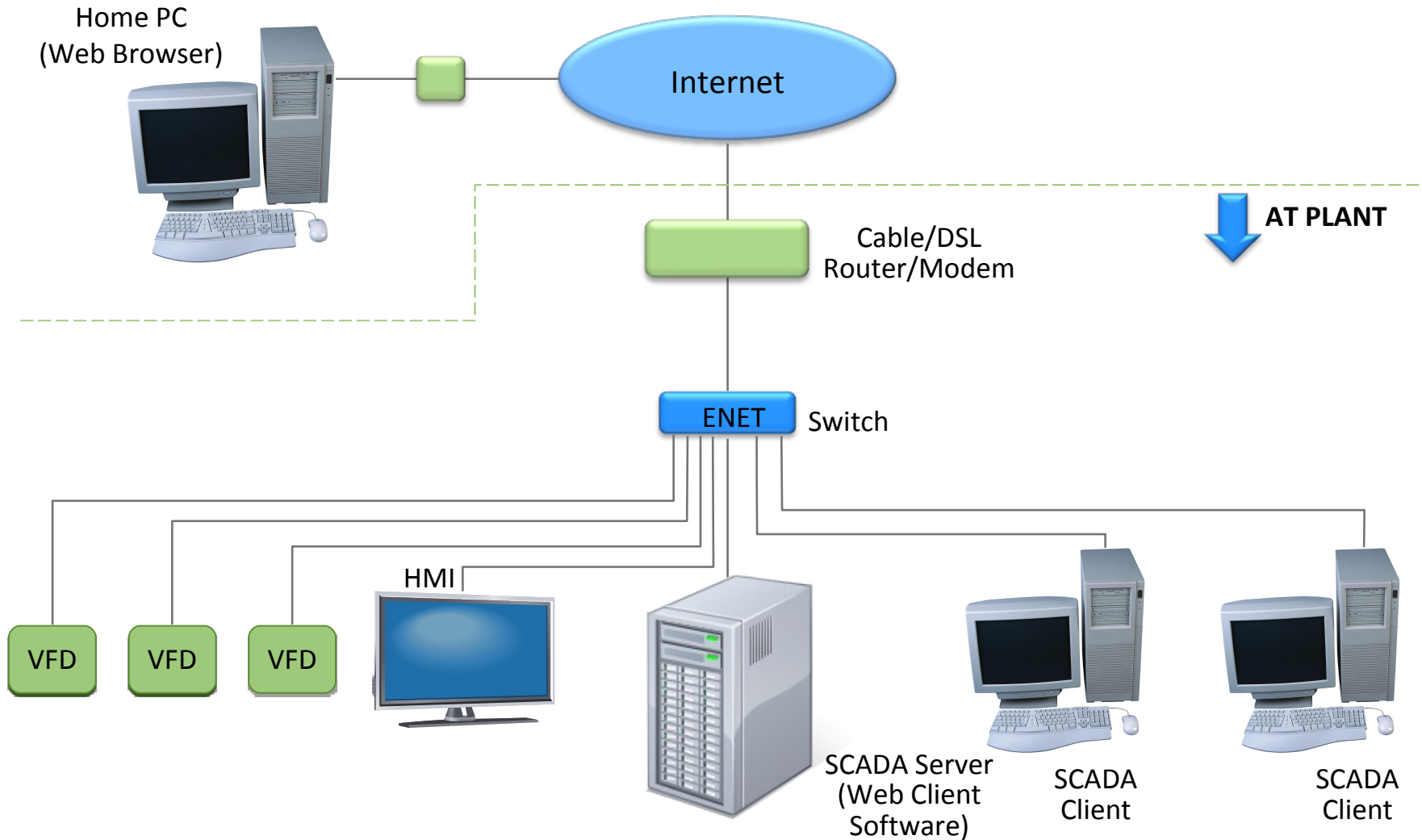
Remote computer only needs Internet Explorer - similar to browsing to a web site

Remote operator sees same thing as if right at the plant

View SCADA screens only

Username and password protection

Monitor Only Remote Operation



Monitor & Control Remote Operation

A VPN (Virtual Private Network) is added to the plant network – either software-based VPN or hardware-based

Plant network needs connectivity to Internet

A remote access computer needs (1) Internet access, and (2) SCADA “client” software installed (Internet Explorer is not good enough)

Monitor & Control Remote Operation (Cont.)

Remote user can do anything that he could do as if accessing SCADA at the plant

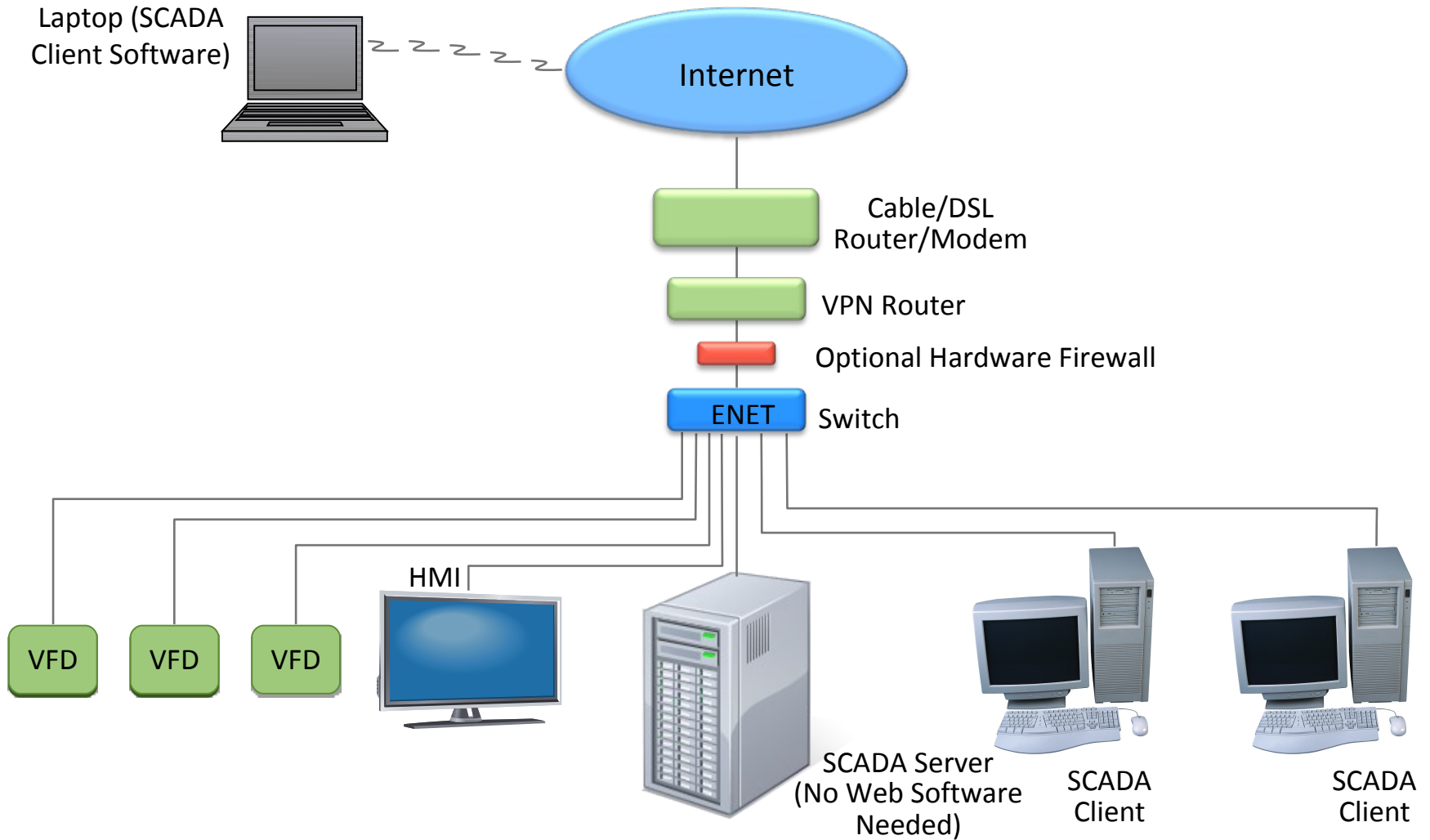
Permissions can be established, either by user, or for any remote access connection

Provides access to the entire network:

- VFDs
- PLC ladder logic
- Excel reports/graphs

Username and password protection (possibly two levels)

Monitor and Control Remote Operation



Comparison of Monitor Only vs. Monitor Plus Control

Monitor Only

Window into system is accessed remotely via Internet Explorer

“View” software is installed at SCADA PC; remote PC only needs Internet Explorer

Can look, but can't touch

A “secure” connection.

Username and password protection.

Monitor, plus Control

A special VPN is configured for remote access - browser not used. “Client” software is installed on the remote PC.

Remote operator can look, and do - start pumps, change setpoints, and wreck the place if he wants to.

A “secure” connection - username and password protection. Permissions can be established to limit remote capabilities.

Connectivity of Remote PC

Under either option, the remote PC needs High Speed Internet Access

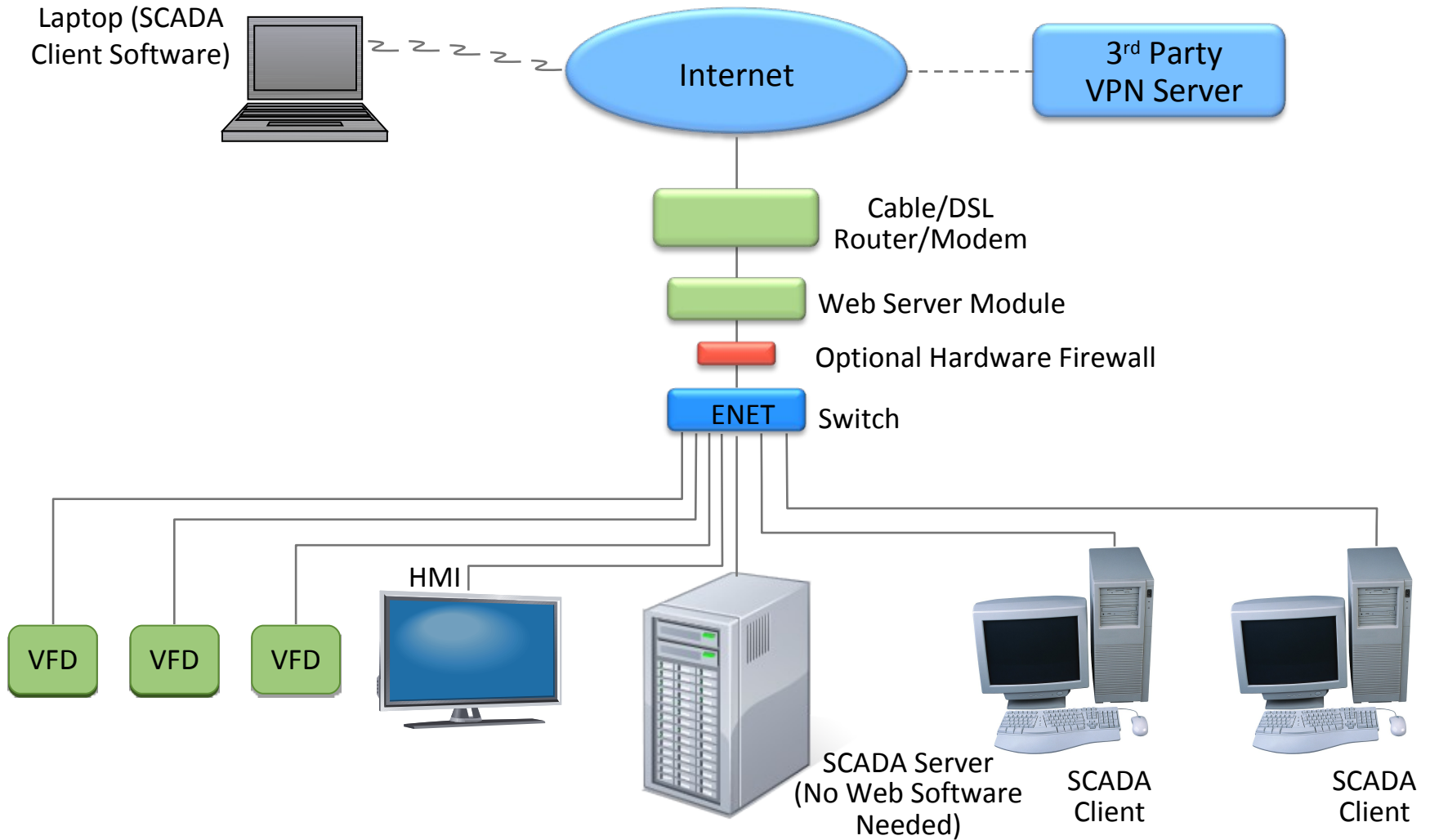
- “Plug-in” Internet access (home cable service or DSL)
- Use of business-provided “wi-fi” internet service
- Wireless broadband service (Verizon, Sprint, etc.)
 - Can use cell phone as wireless broadband connection (“tethering”)

Alternate Remote Access

Web Server-capable Module

- Provides window into Network
- Needs only minimal IT integration at site
- VPN Server is managed by remote 3rd party provider
- Speed may be slower
- All else, same operation as if self-managed VPN

Alternate Monitor & Control Remote Operation



Security Considerations

Use “strong” passwords, and change them regularly

Software firewall – protects server

Hardware firewall – protects entire network

“View Only” Option – can’t be hacked

“Monitor and Control” Option – exercise good security practices

Practical Considerations

Remote Operation is possible. Do you want to?

Consider plant hours of operation

Consider plant level of automation

Consider the risk

- Hacking
- Unintended consequences of possibly removing human element from treatment process

Questions



Thank you

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