

Documenting WirelessHART in SPI 2009

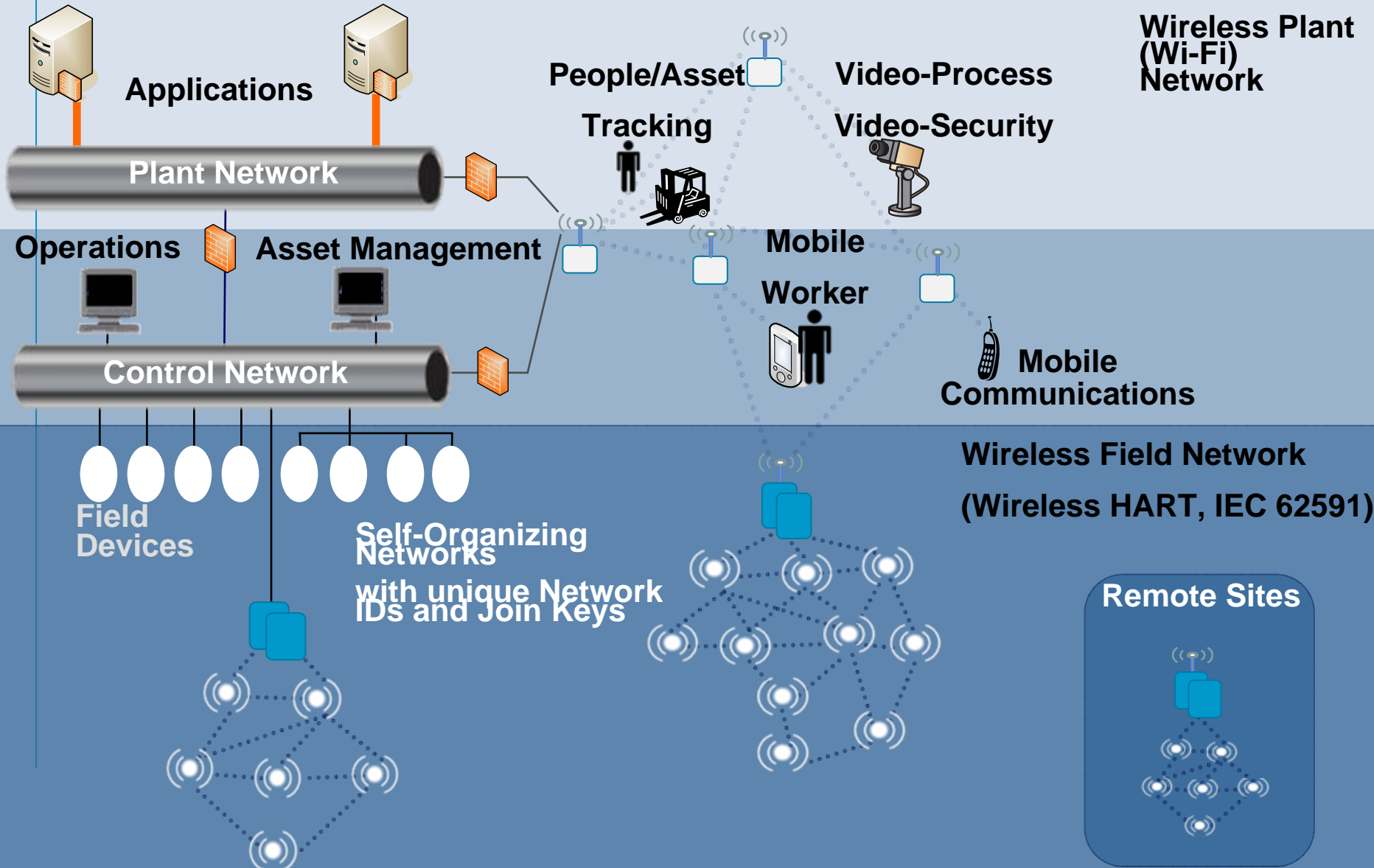
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Overview of Wireless Connectivity



WirelessHART Project Flow

- Maximize cost savings and increase quality of the networks by maximizing number of devices that can be wireless
- Projects always begin with some kind of list of measurements. This list is a good place to start from.
- Project guidelines will help narrow down the list
 - Types of applications (e.g. monitoring, can use update rate in 4 seconds or slower range)
 - Radio range for the topography (e.g. dense pipe racks have shorter range than open fields)

WirelessHART Project Flow (cont'd)

- Typically scope network to process unit, but OK to have more than one network in a unit.
- The Gateway is analogous to a field Junction Box or remote I/O cabinet, and devices to that associate with it (and ONLY it) are like the devices wired back to the Junction Box (except no wires!).
- Assign devices to gateways, check design for number of possible wireless paths and distances, and add devices as necessary.
- Document the design.


What has happened since last meeting?

- Emerson and Intergraph met in London to collaborate on getting WirelessHART structures defined for SPI
- Emerson has developed first draft of WirelessHART Design Guidelines, and it includes a chapter on Documenting WirelessHART in SPI 2009.

Documenting WirelessHART in SPI 2009

- **User Defined Fields**
- Filtered Views
- Creating Instrument Types
- Loop Drawings
- Gateway Cable Block Drawings
- SPI Specification Sheets
- Drawings in SPL – Smart Plant Layout
- Documenting Security Information


User Defined Fields (Global UDFs)

Custom Fields 

Plant:

Item type:

Number	Definition	Field Type	Length
8	Gateway	Char	20
9	WirelessHART Adapter	Char	20
10	Network Design Layout	Char	20
11	Scan Rate	Char	20
12	WirelessHART [Y/N]	Char	20
13		Char	20
14		Char	20
15		Char	1



Fields

User Defined Field (UDF)	Example	Purpose
WirelessHART (Y/N)	Y	Identify a point as wireless or not wireless at a high level. Will be used for quickly applying design guidelines to determine what is and what is not wireless.
Scan rate	2, 4, 8, 16, 32, 64+	WirelessHART devices will not all scan at 1 second like wired HART devices. This value will be important for determining what devices are to be WirelessHART and what is not as well as setting configuration parameters.
Gateway	GWY002	Defines which gateway a WirelessHART point is to be associated.
WirelessHART adapter	WHA001	Defines which WirelessHART adapter a wired HART device is associated with if a device does not have integrated WirelessHART capability.
Network Design Layout	A101.DWG	This is a reference field to a document that was used to validate network design best practices.

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Filtered Views

- A filtered view assists in sorting out device criteria such a sample rate, etc. to help decide which devices can be wireless

Browser View - HART Instruments View [Filtered]

Tag Number	Service	IO Type Name	Loop Name	Criticality	Scan Rate	WirelessHART [Y/N]	Gateway	WirelessHART Adapter	Network Design Layout
101-FY -300		HART AO	101-F -300	Normal		N			
101-FV -300/A	Feedback number 1	HART AI	101-F -300	Normal		N			
101-FT -300		HART AI	101-F -300	Normal		N			
101-PI- 300/A	Fluid Pressure	HART AI	101-F -300			N			
101-FI -300/B	Mass Flow	HART AI	101-F -300			N			
101-TI -300/A	Fluid temperature	HART AI	101-F -300			N			
101-FT -346		HART AI	101-F -346	Low	30 SEC	Y	GWY002		AREA_A_321_LYT
FT346FV		HART AI	101-F -346	Low	30 SEC	Y	GWY002		AREA_A_321_LYT
FT346PV		HART AI	101-F -346	Low	30 SEC	Y	GWY002		AREA_A_321_LYT
101-FT -401		HART AI	101-F -401						
PV1	Vibration Motor-001	HART AI	101-S -001						
101-ST -001	Vibration Motor-001	HART AI	101-S -001						
ST_100_PV	Vibration Motor-001	HART AI	101-S -001						
ST_100_SV	Vibration Motor-001	HART AI	101-S -001						
101-ST -001 /1	Vibration Motor-001	HART AI	101-S -001						
101-SX -001	Vibration Motor-001	HART AO	101-S -001						

Clear the buffer Clear the current field

AREA_A_321_LYT

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Creating Instrument Types

Instrument Types ✕

Process function:
Flow ▼

Find an instrument type:

Instrument Type	Description	CS Tag Instrum Type Alias
FSH	HIGH-FLOW SWITCH	FSH
FSL	LOW-FLOW SWITCH	FSL
FT	MASS FLOW TRANSMITTER	FT
FT	HART FLOW TRANSMITTER	FT
FT	Fieldbus FT	
FT	D/P TYPE FLOW TRANSMITTER	FT
FT	WirelessHART Transmitter	
FT	Profibus PA flow transmitter	FT

OK Cancel Apply Profile... New Delete Help

Instrument Type Profile



- General
- Wiring and Control System
- Custom Tables
- Calibration

Instrument type: Instrument type description:

Instrument specifications

Include instrument specification:

Specification form:

Multi-tag list format:

Copy data from template:

Maintenance event form:

Hook-ups

Include hook-ups

Include in BOM

Hook-up type:

Hook-up:

I/O Type

Include I/O type:

Miscellaneous

Skip loop creation

Process data workflow required

Location

Include location:

Enhanced SmartLoop symbol

Symbol file name and path:

Dimensional data

Include dimensional data:

Group name:

Set as default instrument type for SmartPlant Integration

- OK
- Cancel
- Apply
- Copy From...
- Function Block...
- Help

Instrument Type Profile



- General
- Wiring and Control System**
- Custom Tables
- Calibration

Instrument type:
FT

Instrument type description:
WirelessHART Transmitter

- Include wiring
- Control system
- Automatic CS tags

Reference device panel:
WIRELESSHART TRANSMITTER

Conventional connections

Reference Cable	Cable Set	Terminal Strip	Starting Terminal	Connection Type	Signal Propagation S	C

- New...
- Properties...
- Delete

Plug-and-socket connections

Reference Cable	Cable Connector	Panel Port	Signal Propagation S	C

- New...
- Properties...
- Delete

- OK
- Cancel
- Apply
- Copy From...
- Function Block...
- Help

Symbols (Device Panel Properties)

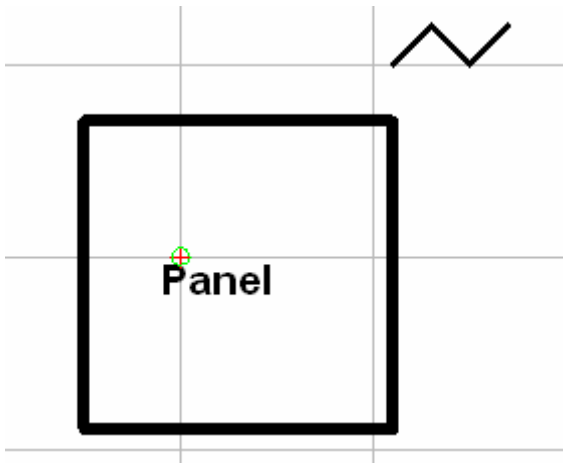
Device Panel Properties

General Power Supply **Associate Symbols**

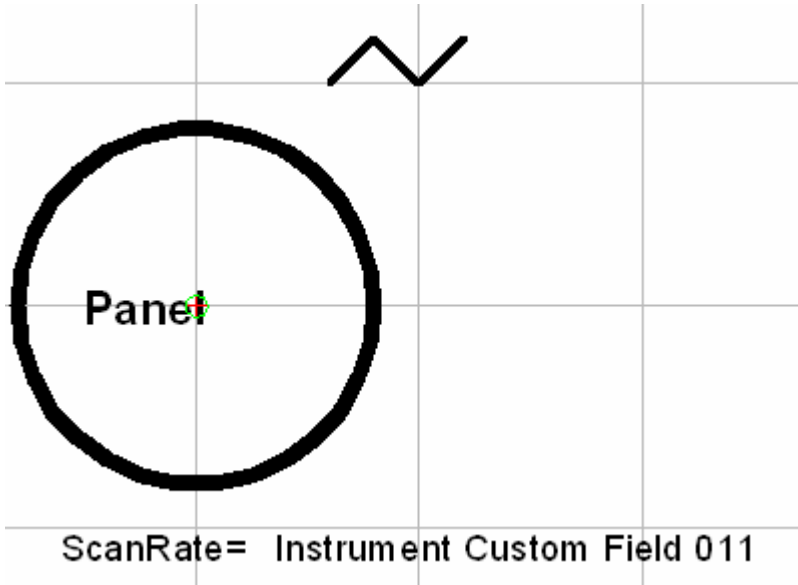
Panel:
WIRELESSHART TRANSMITTER

Name	Symbol File	
Enhanced SmartLoop	WirelessHART.sym	Browse...
Cable Block Drawing	C:\Program Files\SmartPlant\Instrumentatic	Browse...

Symbols



GATEWAY

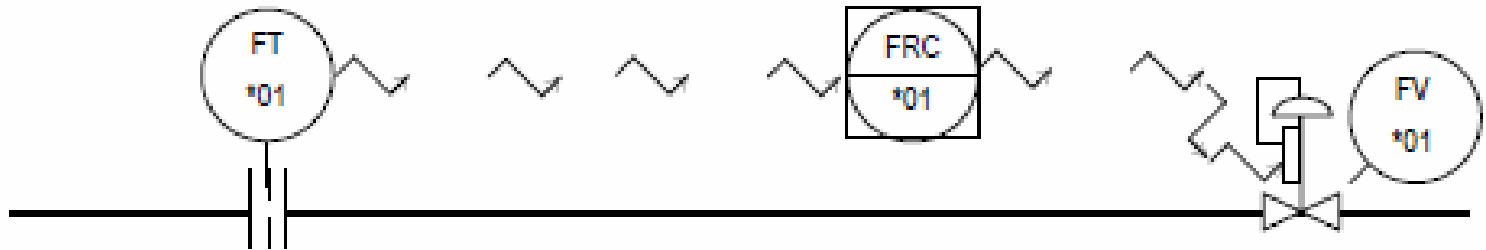


FIELD DEVICE

Symbols Example

- Example from ISA 5.1

B.9.5 Shared display, shared control and wireless instrumentation:



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Loop Drawings

- Individual Field Devices
 - Fully wireless device (it has no communication wiring)
 - Devices on Wireless HART Adapters (has 4-20 ma wiring, and Wireless HART Adapter wired in series with 4-20 ma)
- Gateways
 - Currently there is no automatic drawing that essentially lists all devices associated with Gateway, but we can filter and print an index listing that does same thing.
 - Need a drawing showing power and communications wiring between Gateway and Host.

Use Filtered View to Sort by Gateway

Browser View - HART Instruments View [Filtered]

Tag Number	Service	IO Type Name	Loop Name	Criticality	Scan Rate	wirelessHART [Y/N]	Gateway	wirelessHART Adapter	Network Design Layout
FT346FV		HART AI	101-F -346	Low	30 SEC	Y	GWY002		
FT346PV		HART AI	101-F -346	Low	30 SEC	Y	GWY002		
101-FT -346		HART AI	101-F -346	Low	30 SEC	Y	GWY002		AREA_A_321_LY
101-ST -001	Vibration Motor-001	HART AI	101-S -001				GWY003		
101-SX -001	Vibration Motor-001	HART AO	101-S -001				GWY003		
101-TI -300/A	Fluid temperature	HART AI	101-F -300			N			
101-FI -300/B	Mass Flow	HART AI	101-F -300			N			
101-PI- 300/A	Fluid Pressure	HART AI	101-F -300			N			
101-FT -300		HART AI	101-F -300	Normal		N			
101-FY -300		HART AO	101-F -300	Normal		N			
101-FV -300/A	Feedback number 1	HART AI	101-F -300	Normal		N			
FT348_PV		HART AI	101-F -348						
101-YO -348		HART AI	101-F -348						
101-FT -348		HART AI	101-F -348						
101-FT -401		HART AI	101-F -401						
ST_100_PV	Vibration Motor-001	HART AI	101-S -001						
ST_100_SV	Vibration Motor-001	HART AI	101-S -001						
101-ST -001 /1	Vibration Motor-001	HART AI	101-S -001						
PV1	Vibration Motor-001	HART AI	101-S -001						

Print the Filtered View for each Gateway

Print Preview: HART Instruments View Report

Group separator
 None Insert a separating line Insert a page break

Total sum/average
 Yes No

Horizontal printing
 Print all pages Show first column on each page

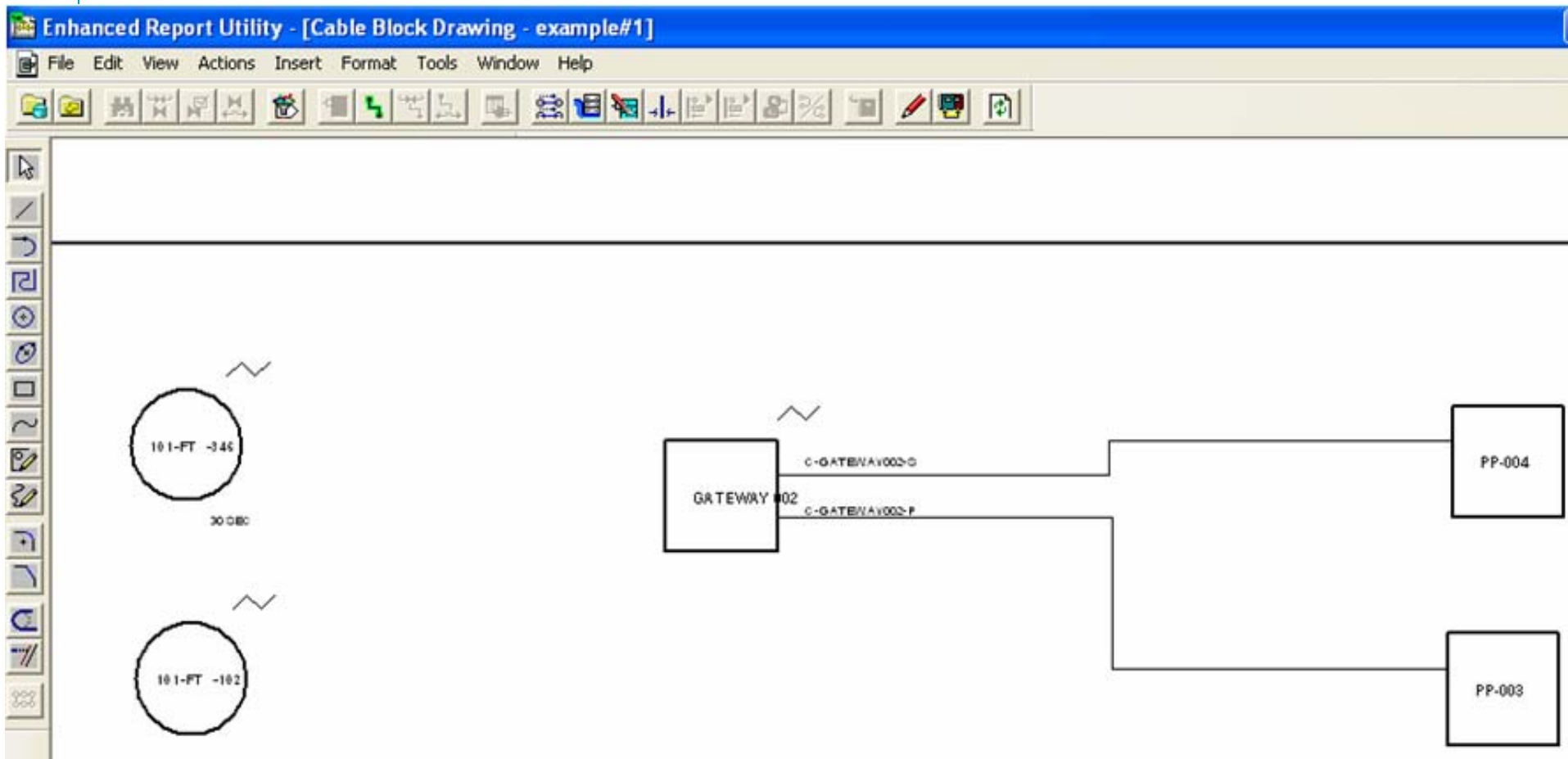
DEMO_113 Plant: New Refinery Area: Crude Area Unit: Crude unit 1 Document No.: Crude unit 1InstrumentIndex By: Approved:			HART Instruments View				Page 1 of 3 Horizontal Section 1 o Date: 7/7/2010		
Revision No.:	Checked:	Signed by:							
Tag Number	Service	IO Type Name	Loop Name	Criticality	Scan Rate	WirelessHART [Y/N]	Gateway	WirelessHART Adapter	Network Design Layout
FT346FV		HART AI	101-F -346	Low	30 SEC	Y	GWY002		
FT346PV		HART AI	101-F -346	Low	30 SEC	Y	GWY002		
101-FT -346		HART AI	101-F -346	Low	30 SEC	Y	GWY002		AREA_A_321_

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Gateway Cable Block Drawing

- Show Gateway power and communications connections



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Domain Explorer

Domain Explorer



101-F -2213
101-F -2214
101-F -2215
101-F -300
101-F -346
101-FT -346
FT346
101-FT -346-SP
101-FT -346-PD
FT346FV
FT346FV
FT346PV
FT346PV
LD 101-F -346
101-F -347
101-F -348
101-F -400
101-F -401
101-F -500
101-F -501
101-F -51
101-F -52
101-F -53
101-F -54
101-F -55
101-F -56
101-F -57
101-F -58
101-F -905
101-F -906
101-F -907
101-F -908
101-F -909

101-F -346 List Count: 0

Instrument Specification - 101-FT -346

Page 1 Notes

GENERAL	1	Tag Number	101-FT -346		
	2	Service			
	3	Location	100-PID01-001		
	4	Area Classification			
	5	Mounting			
	6	Certification	ATEX...		
	7	Barrier - Manufacturer / Model			
	8				
PROCESS CONDITIONS	9	Fluid			
	10	Pressure Max	Oper.		
	11	Temperature Max.	Oper.	°C	°C
	12	Oper. Spec. Gravity	Oper. Viscosity		cP
	13	Vacuum	Over Pressure		
	14	Scan Rate	30 Sec.		
	15	Application			
TRANSMITTER	16	Type			
	17	Enclosure			
	18	Housing	Paint		
	19	Power Supply	Load Resist	Intrin. safe replacable battery	
	20	Process Connection	Electrical Connection		
	21	Accuracy	Response Time		
	22	Max. Static Pressure			
	23	Element Material			
	24	Wetted O - Ring Material			
	25	Fill Fluid			
	26	Range Limits			
	27	Calibrated Range			
	28	Elevation	Suppression		
	29	Allow. Oper. Pressure	Allow. Oper. Temp.		
30					
DIAPHRAGM SEAL	31	Process Connection & Rating			
	32	Diaphragm Material			
	33	Capillary Material			
	34	Fill Fluid			
	35	Housing Material			
	36	Allowable Over Temperature			
	37				
	38	Communication Type	Wireless HART		

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Smart Plant Layout

- Add WirelessHART field devices to same Plan drawings as wired devices, in same manner.
- Add WirelessHART gateways to drawings. (Using location previously decided during WirelessHART network design.)

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Documenting Security Information

- Network ID, Join Key, and passwords generally should not be recorded in a drawing package.
- These should be managed per a local security policy implemented by the Owner/Operator.

More Information

- Wireless Systems Engineering Guide
 - www.emersonprocess.com
 - Mouse-over “Brands”
 - Choose “Rosemount”
 - Click on “Wireless”
 - Click on “Wireless Articles and Resources”
 - Choose “[IEC 62591 WirelessHART System Engineering Guide](#)”
- HART Communications Foundation
 - hartcomm.org