



OCT 2-4 2012
Louisville, KY

Session 113 - Integrating
Tablets and SmartPhones

Booth 860 - NMEA ConnectFest

SESSION 113

INTEGRATING TABLETS

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CTO – Chetco Digital Instruments
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Today's Overview

1

- Getting Data to your Tablet

2

- Pulling Vessel Data

3

- Pushing Vessel Data

Getting Data to your Tablet

1

- Point to Point

2

- Ad Hoc Network

3

- Infrastructure Network

Getting Data to your Tablet

Point to Point

- **Serial/USB Cable**
 - Attach directly to sensor
 - 16 feet max
- **SD/USB Memory Card**
 - Remote data log and retrieve
- **Bluetooth**
 - Wireless with 100 ft range
- **WiFi - 802.11**
 - Wireless 300 ft range
 - Widely supported

Getting Data to your Tablet

Point to
Point

- **Direct Serial**

- \$IIXDR,G, 54##00,G,P
- \$IIXDR,G, 54##00,G,P FUEL
- \$IIXDR,G, 54##00,G,P FUEL
- \$IIXDR,G, 54##00,G,P FUEL 9*0B
- \$IIXDR,G, 54##00,G,P FUEL 9*0B
- \$IIXDR,G, 54##00,G,P FUEL 9*0B
- \$IIXDR,G, 54##00,G,P FUEL 9*0B
- \$IIXDR,G, 54##00,G,P FUEL 9*0B
- \$IIXDR,G, 54##00,G,P FUEL 9*0B



Getting Data to your Tablet

Point to
Point

- **Bluetooth**

- \$WIMWV,182.6,R,0.4
- \$HCHDT,299.9,T*22
- \$TIROT,-5.8,A*1B
- \$WIMWV,182.6,R,0.3
- \$HCHDT,300.0,T*22
- \$WIMWV,182.6,R,0.3
- \$TIROT,-5.8,A*21
- \$WIMWV,141.6,T,0.2,N,A*25



Getting Data to your Tablet

Point to
Point

- **WiFi 802.11 b/g**

- \$WIMWV,182.6,R,0.4

- \$HCHDT,299.9,T*22

- \$TIROT,-5.8,A*1B

- \$WIMWV,182.6,R,0.3

- \$HCHDT,300.0,T*2A

- \$WIMWV,182.6,R,0.3

- \$WIMWV,182.6,R,0.3

- \$WIMWV,182.6,R,0.3

- \$WIMWV,141.6,T,0.2,N,A*25



Getting Data to your Tablet

Point to
Point

- **Analog Gateway**

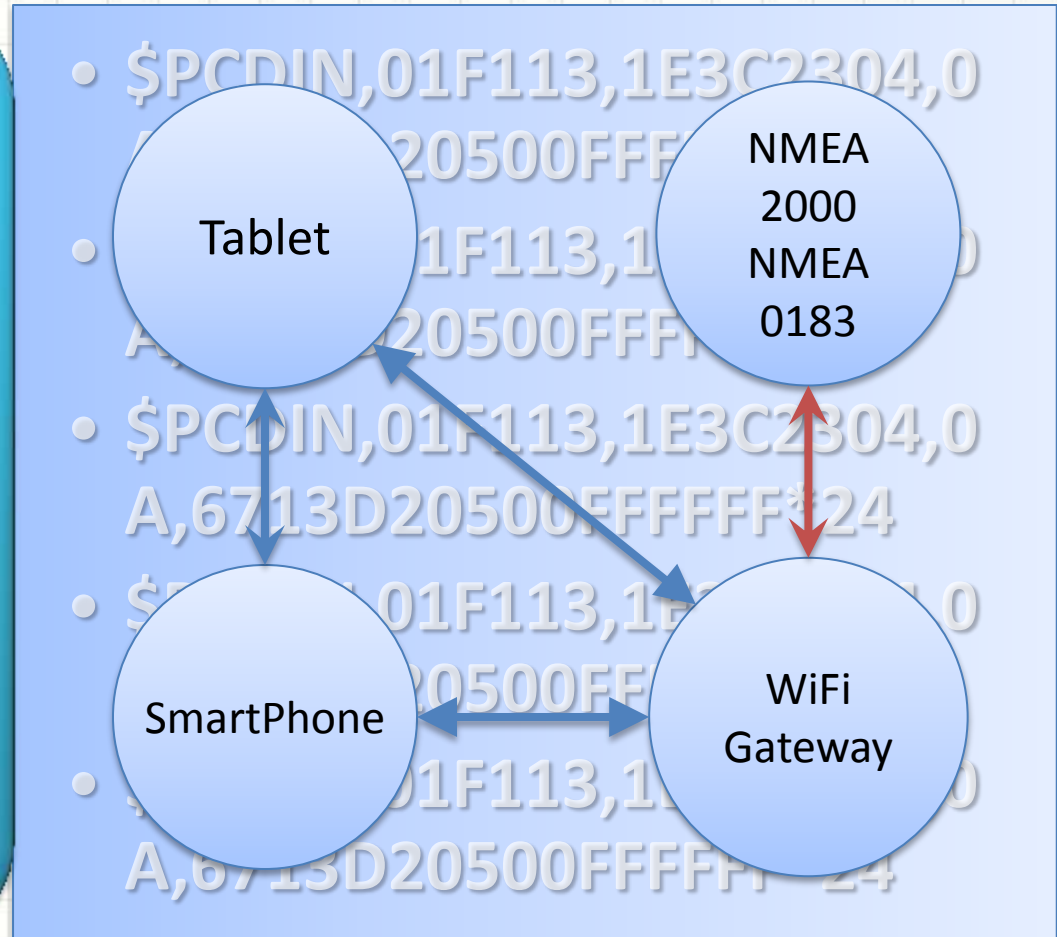
- \$IIXDR,G,54##00,G,P FUEL 9*0B
- \$IIXDR,G,54##00,G,P 8*0B
- \$IIXDR,G,54##00,G,P 7*0B
- \$IIXDR,G,54##00,G,P FUEL 9*0B
- \$IIXDR,G,54##00,G,P FUEL 9*0B
- \$IIXDR,G,54##00,G,P TEMP 9*0B
- \$IIXDR,G,54##00,G,P OIL 8*0B
- \$IIXDR,G,54##00,G,P FUEL 9*0B



NMEA – Ethernet – WiFi – USB - Serial

Getting Data to your Tablet

Ad Hoc
Network



Getting Data to your Tablet

Ad Hoc Network

- **Connect Multiple Sensors**
 - Common bus (Ethernet/802.11 WiFi)
 - Utilize Gateways to bridge protocols (NMEA 2000 to TCP/IP)
- **Simple Setup**
 - Auto-configure
 - Multiple Tablet Devices
- **Local Access**
 - Wireless 300 ft range
 - 802.11 b/g Widely supported

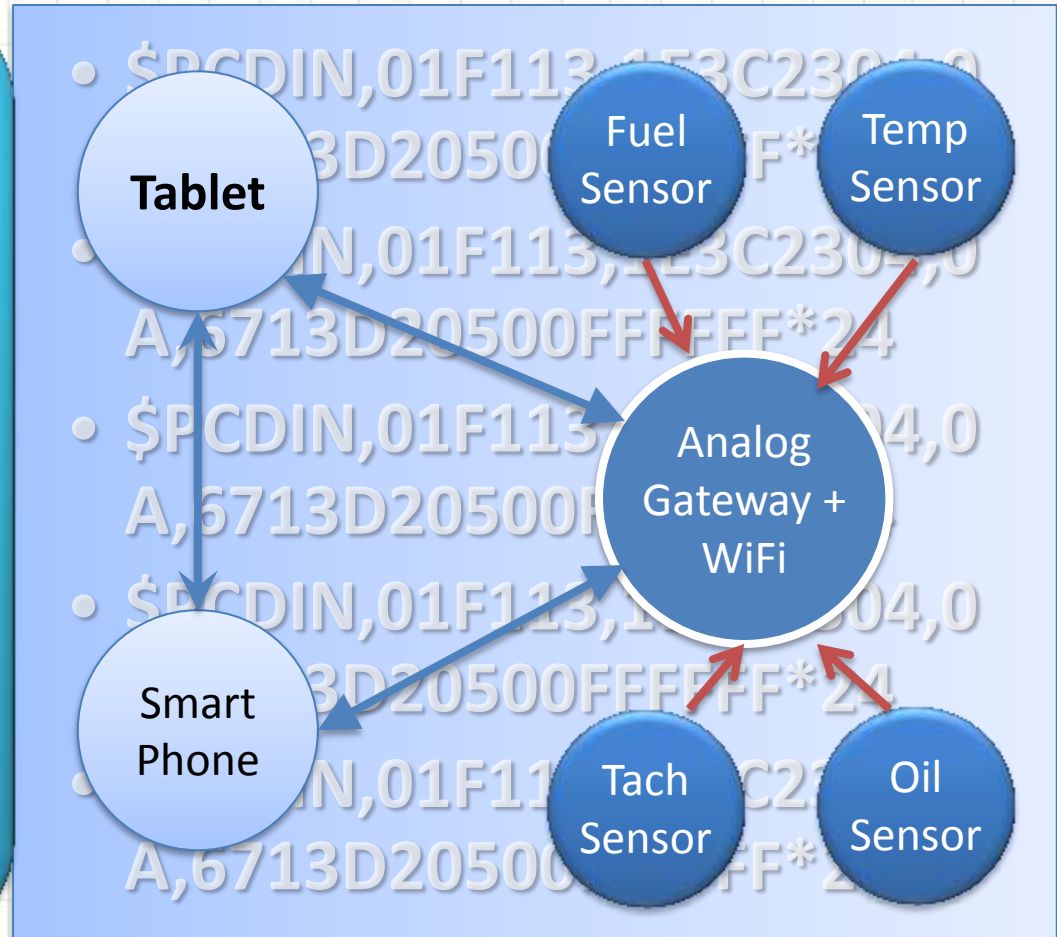
Getting Data to your Tablet

Ad Hoc Network

- **NMEA 0183**
 - Point to Point/Daisy Chained
 - Convert Serial (RS232) to TCP/IP
- **NMEA 2000**
 - Multiple Sensors on one bus (100's)
 - Convert CAN Frames to TCP/IP
 - Requires NMEA Certified Gateway
- **Direct Analog**
 - TDM channels into single TCP Port
 - Requires Analog Gateway

Getting Data to your Tablet

Ad Hoc
Network



Getting Data to your Tablet

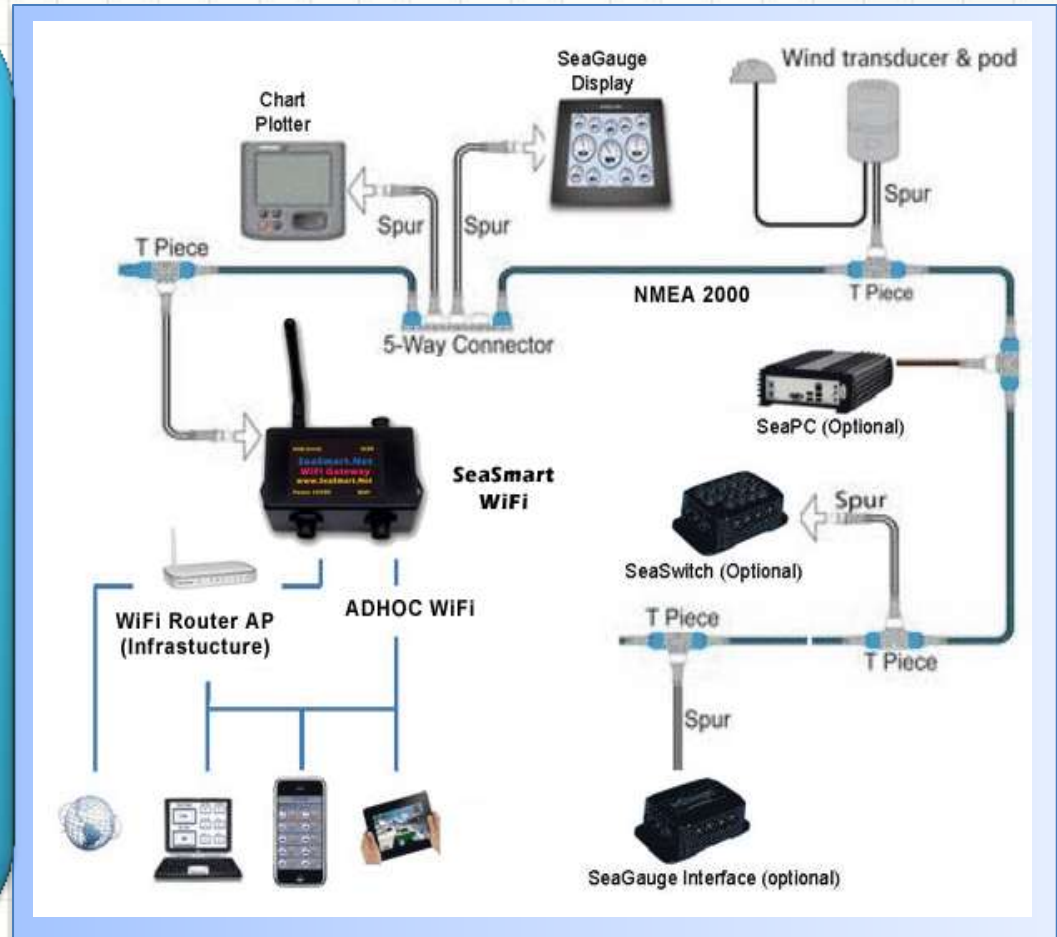
Ad Hoc
Network

- \$PCDI
A,71
 - \$P DI
A,6/1
 - \$P DI
IN,01F113,1E3C2304,0
- 8 channel analog Interface
802.11 b/g WiFi
Embedded Web Server
USB Interface to PC/Laptop
12VDC/USB Bus Powered



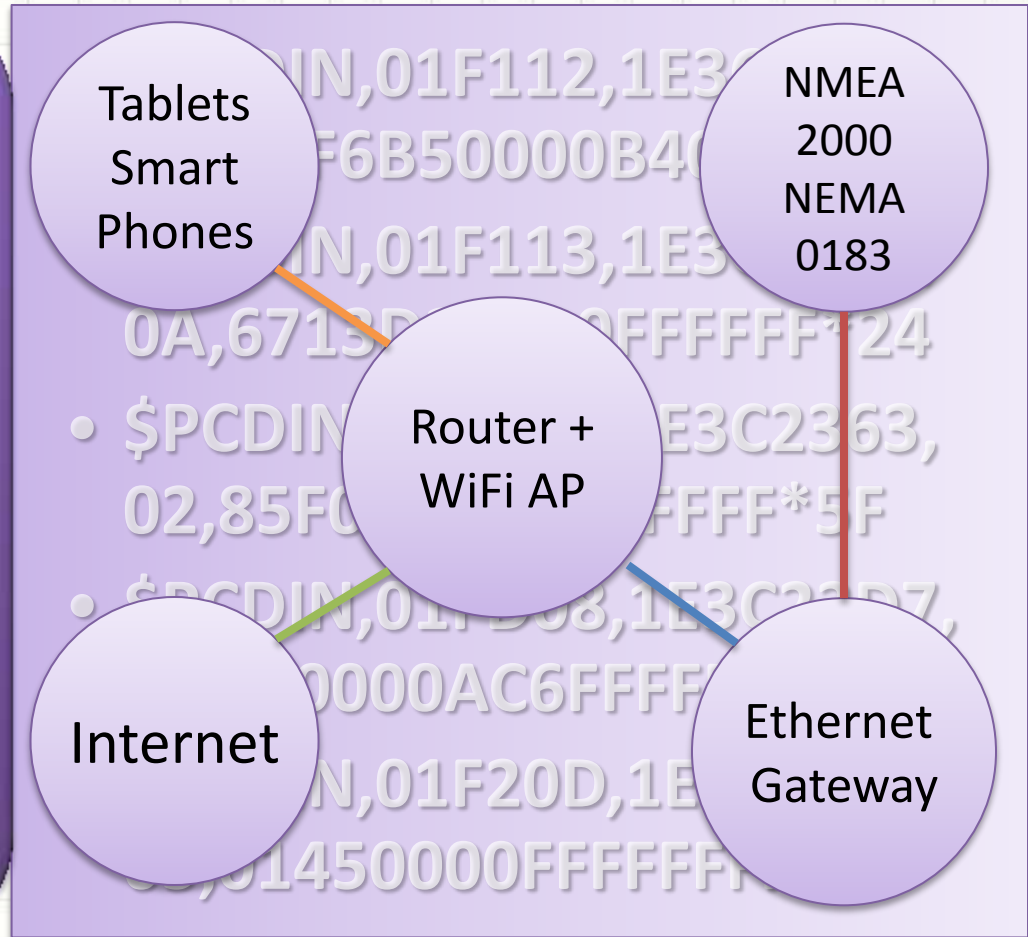
Getting Data to your Tablet

Ad Hoc
Network



Getting Data to your Tablet

Infrastructure
Network



Getting Data to your Tablet

Infrastructure
Network

- **Connect Multiple Sensors**
 - Common Bus (Ethernet)
 - Utilize Gateways to Bridge Protocols (NMEA 2000/0183)
- **Router Based**
 - Managed network
 - Robust and Expandable
- **Global Access**
 - Internet
 - Cloud Servers

Getting Data to your Tablet

Infrastructure Network

- **NMEA 0183**
 - Point to Point/Daisy Chained
 - Convert Serial (RS232) to TCP/IP
- **NMEA 2000**
 - Multiple Sensors on one bus (100's)
 - Convert CAN Frames to TCP/IP
 - Requires NMEA Certified Gateway
- **Direct Analog**
 - TDM channels into single TCP Port
 - Requires Analog Gateway

Getting Data to your Tablet

Infrastructure
Network

- * 10/100 MB Wired Ethernet 300 ft
- * NMEA Protocol Translation
- * Static/DHCP IP with Gateway IP
- * Embedded Web Server
- * FTP/SMTP/FLASH DATA LOG



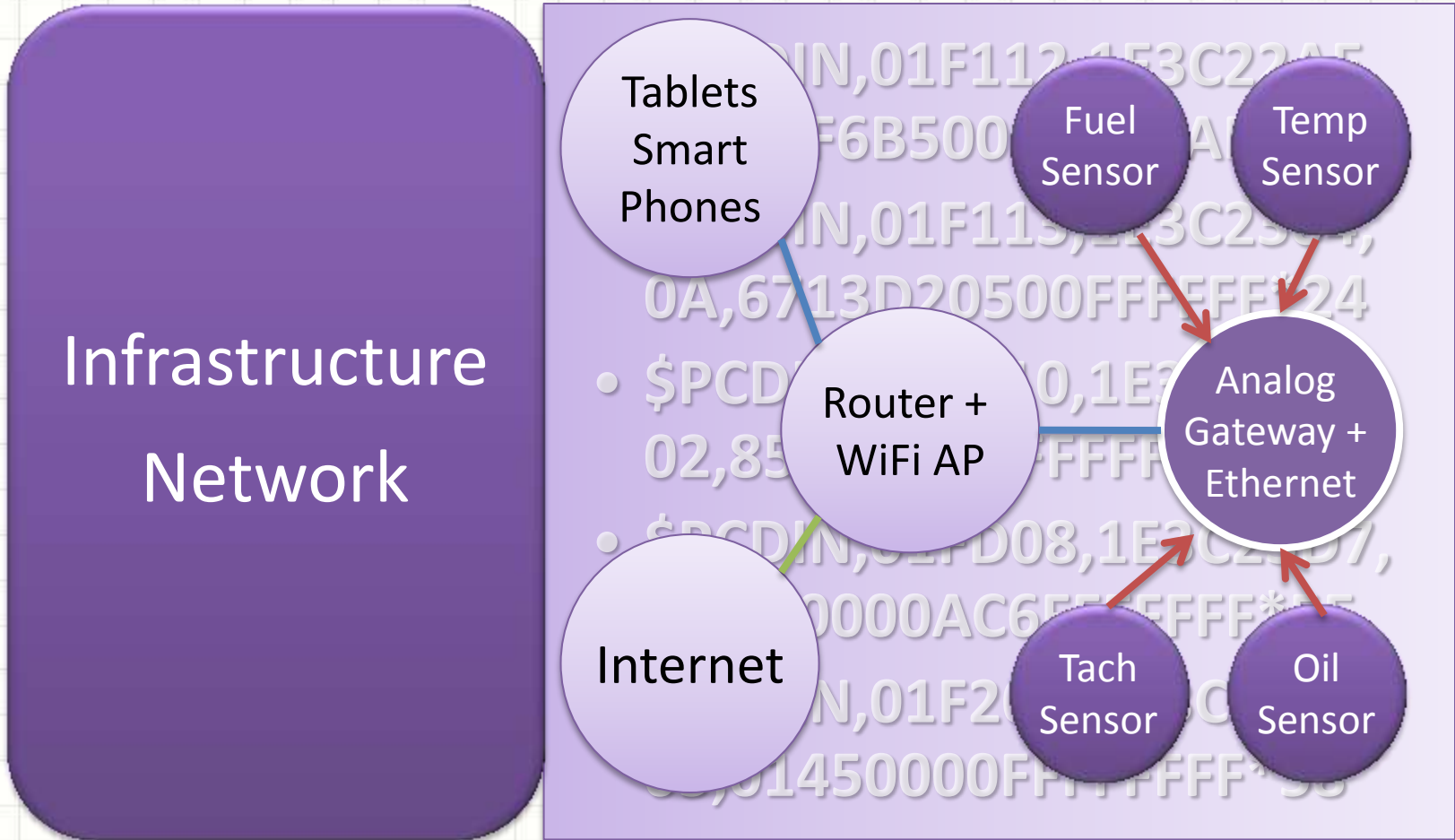
Getting Data to your Tablet

Infrastructure
Network

- * NMEA 2000 and 0183 Interface
- * Combines inputs to single TCP port
- * USB Interface to PC/Laptop
- * NMEA 2000/USB Bus Powered

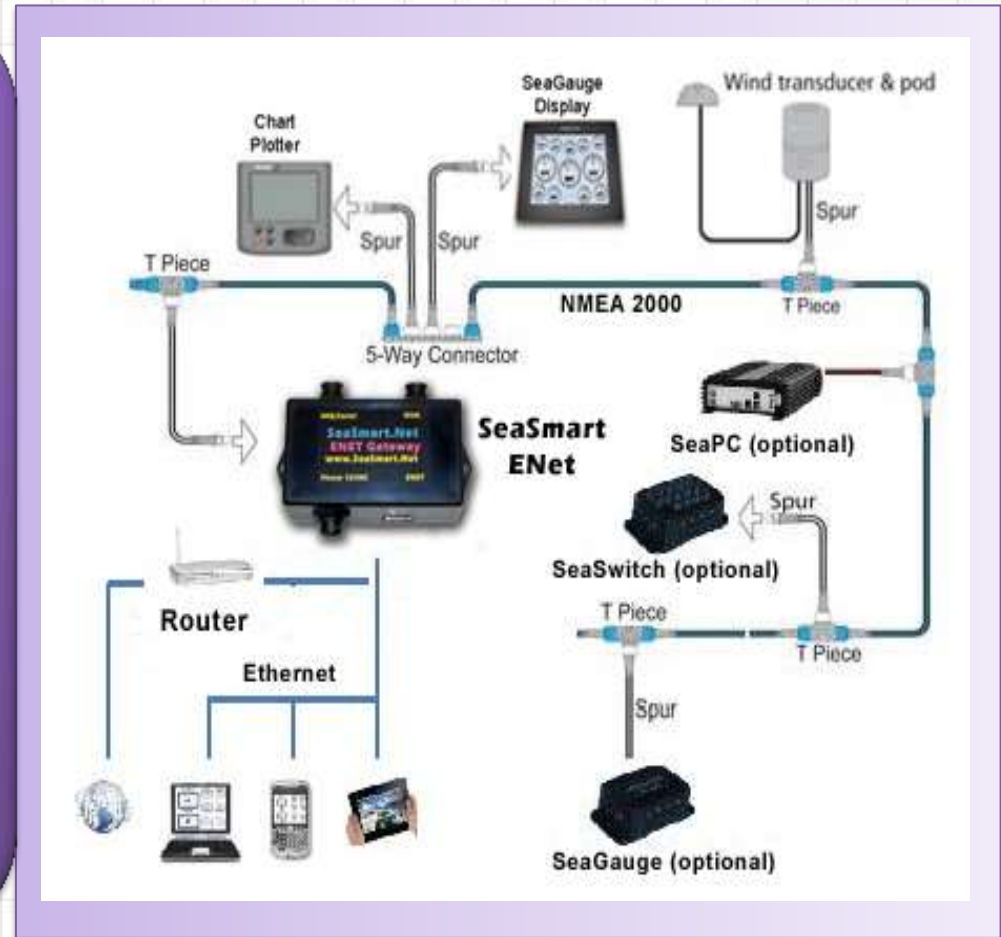


Getting Data to your Tablet



Getting Data to your Tablet

Infrastructure
Network



Pulling Vessel Data

1

- App Based

2

- Browser Based

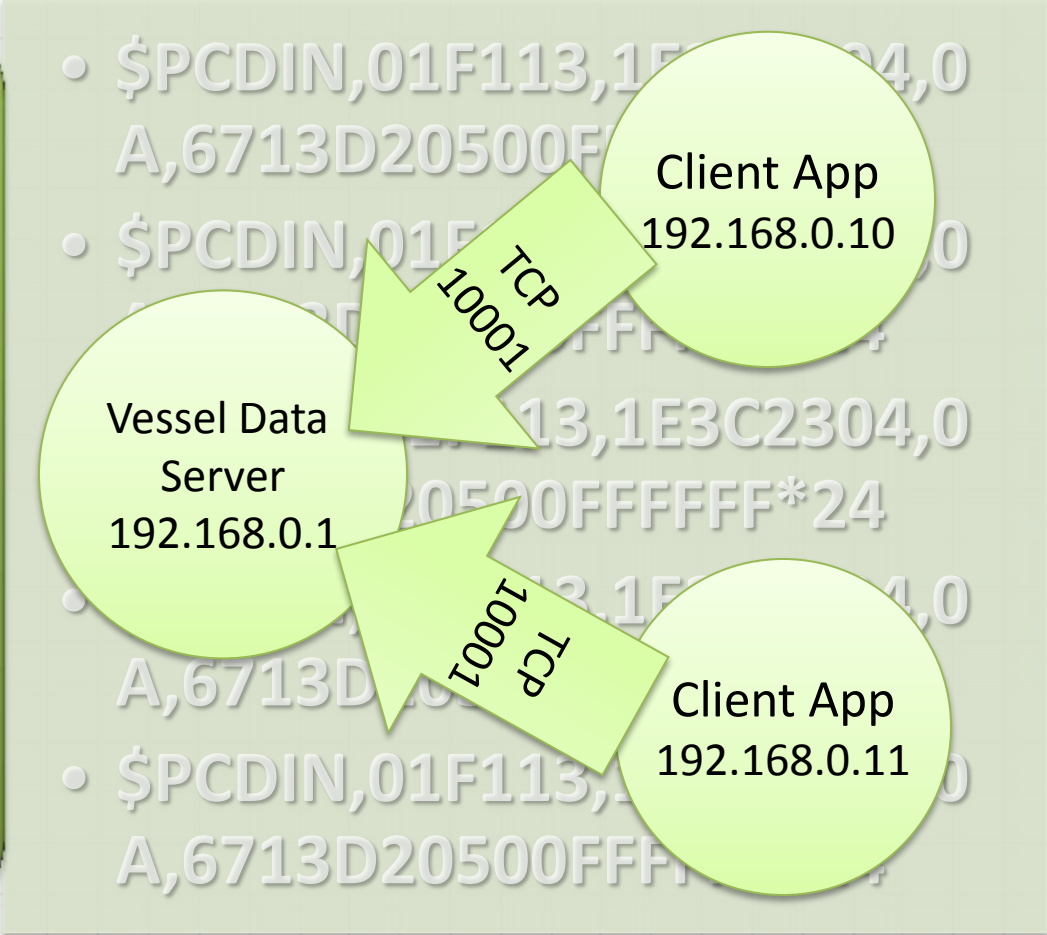
Pulling Vessel Data

App
Based

- **Application Initiated**
 - Client to Network IP (known)
 - Managed by Client
- **Server TCP Port Number**
 - Supports multiple clients (5-10)
 - Connection is closed by client
- **UDP Broadcast**
 - Uses Client local IP Address
 - Data sent to all nodes on local Network

Pulling Vessel Data

App Based



Pulling Vessel Data

App
Based

The screenshot shows the 'TCP/IP NMEA Client' application window. It features a 'Save' button in the top right corner. The configuration section includes a 'Link' toggle set to 'ON' with an 'Account' button next to it. Below are input fields for 'Host' (192.168.0.101) and 'Port' (10001). There are also five toggle switches for 'Disconnect Alarm', 'Enable Waypoints', 'Location Services', and 'AP Repeat', all of which are currently set to 'OFF'. At the bottom of the window, a black log area displays a list of NMEA sentences in green text, including various SPCDIN commands with their respective parameters.

```
SPCDIN,01FD02,0A23F7EB,23,212400C0F4FAFFFF*55
SPCDIN,01F113,0A23F81F,23,CE27ADFCFFFFFFFF*5F
SPCDIN,01F112,0A23F821,23,560A440000D8F5FD*56
SPCDIN,01F113,0A23F880,23,CFFS82FDFFFFFFFF*5D
SPCDIN,01F112,0A23F881,23,570A440000D8F5FD*5D
SPCDIN,01FD02,0A23F8E5,23,22FFFFFFFFF8FFFF*50
SPCDIN,01F810,0A23F8E6,23,FFF0FFFFFFFFFFFF*2C
SPCDIN,01F110,0A23F8E6,23,46FF7F66FFE200FF*58
SPCDIN,01F113,0A23F8E9,23,D027ADFCFFFFFFFF*26
SPCDIN,01F801,0A23F8E9,23,FFFFFF7FFFFFFFF7*5D
SPCDIN,01F802,0A23F8EC,23,FFFFFFFFFFFFFFFF*24
SPCDIN,01FD07,0A23F8EE,23,8FC1C373FF7FFA03*56
SPCDIN,01F112,0A23F8EE,23,580A440000D8F5FD*5B
SPCDIN,01FD13,0A23F8E8,23,F0FFFFFFFFFFFFFFFF7FFFFFFF7F2400C0F4FAFFF...
SPCDIN,01F113,0A23F949,23,D1F582FDFFFFFFFF*29
SPCDIN,01F112,0A23F94B,23,590A440000D8F5FD*2D
```

Pulling Vessel Data


App
Based

- **Vendor Specific**
 - Usually Fee based
 - Closed Architecture
 - Platform Dependent
- **Better Client Response**
 - Data rendered locally
 - Real time viewing
- **Remote Access**
 - Can connect over Internet
 - Data Log Option

Pulling Vessel Data

App
Based

iNavX: <http://www.inavx.com/>

- \$PCDIN 0151 2304,0
A,671 *24
 - \$PCD 2304,0
A,671 *24
 - \$PCD 2304,0
A,671 *24
 - \$PCD 2304,0
A,671 *24
- 

Pulling Vessel Data

App
Based

NMEAremote: <http://www.zapfware.de/en/>

- \$PCDIN,01F113,1E3C2304,0
A,6713D20500FFFFFF*24



- \$PCDIN,01F113,1E3C2304,0
A,6713D20500FFFFFF*24

Pulling Vessel Data

App
Based

nGauge: <http://www.millportmedia.com>



Pulling Vessel Data

App
Based

vDash: <http://www.seagauge.com>



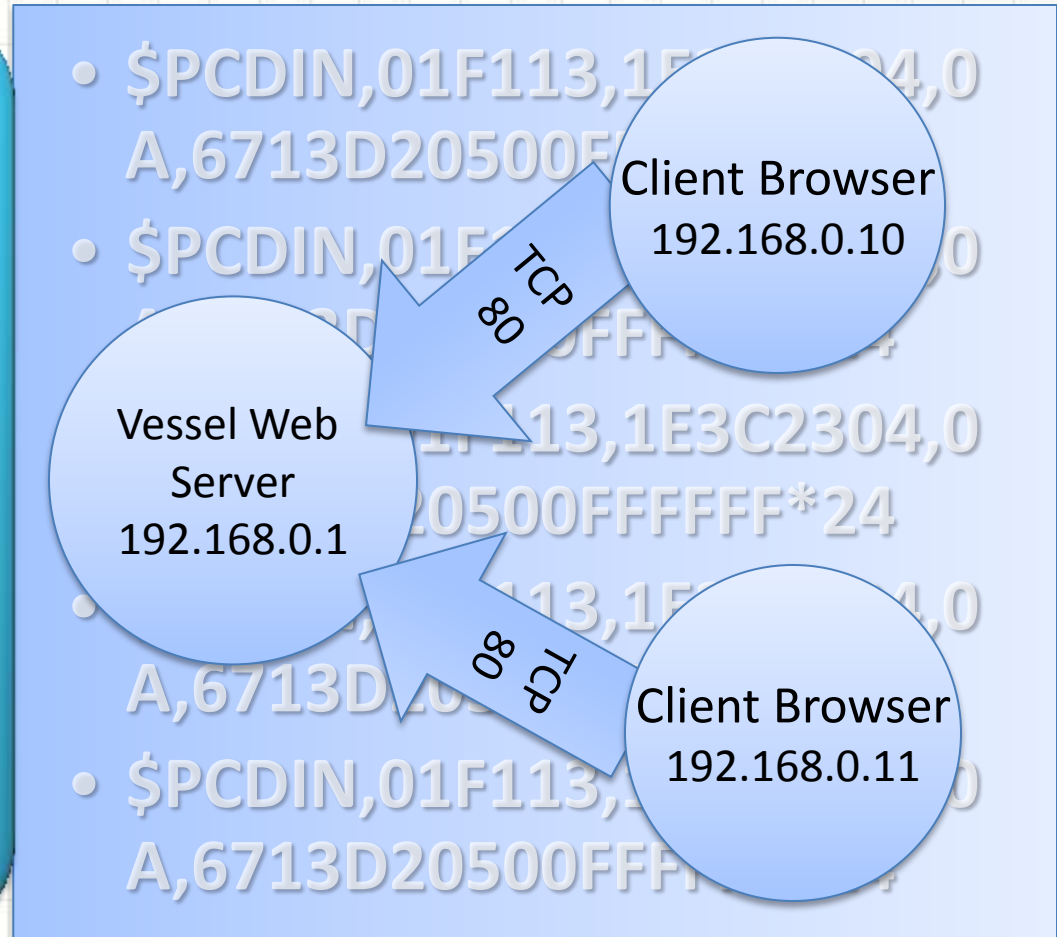
Pulling Vessel Data

Browser
Based

- **Cross-Platform Compatibility**
 - Single Server = Multiple devices
 - HTTP Base code = Many Browsers
- **Common HTML/Java**
 - Extensive tool Library
 - Open Source = No royalties
- **Local/Global Access**
 - Intranet
 - Internet

Pulling Vessel Data

Browser Based



Pulling Vessel Data

Browser
Based

- **Common User Interface**
 - Local Server
 - Internet Server
- **User Customizable**
 - Flash File Updates
 - XML/CSS Configuration
 - AJAX = real time updates
- **No Fees**
 - Simple setup
 - Global installed base

Pulling Vessel Data

Browser
Based

iPad Safari

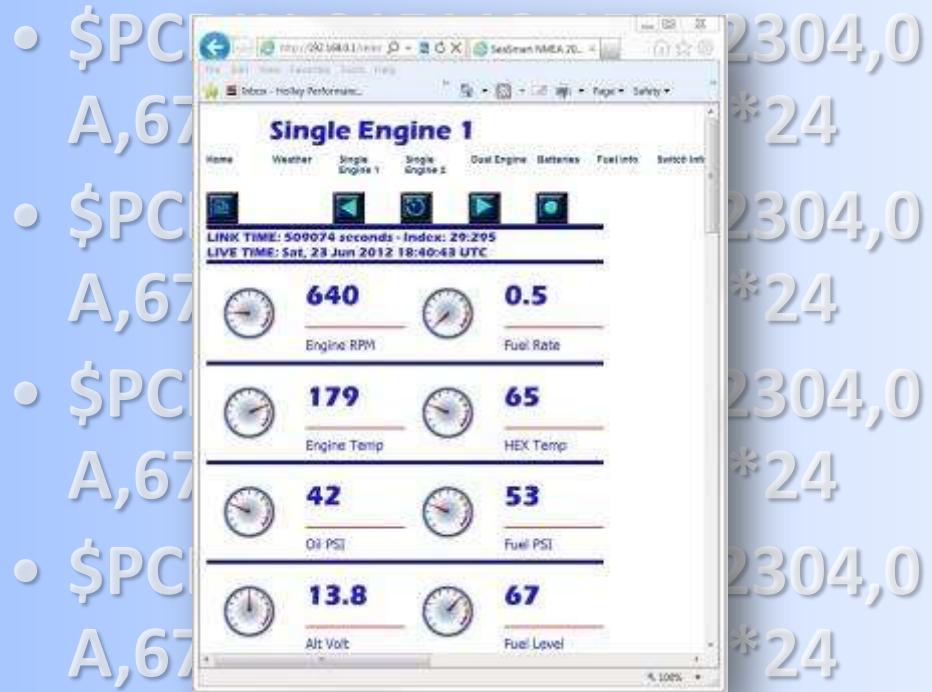
- \$PCDIN,01E112,1500C2304,0
A,671 F*24
- \$PCDIN,01E112,1500C2304,0
A,671 F*24
- \$PCDIN,01E112,1500C2304,0
A,671 F*24
- \$PCDIN,01E112,1500C2304,0
A,671 F*24



Pulling Vessel Data

Browser
Based

Explorer



Pulling Vessel Data

Browser Based

FireFox

- \$PCD A,67:2304,0 *24
 - \$PCD A,67:2304,0 *24
 - \$PCD A,67:2304,0 *24
 - \$PCD A,67:2304,0 *24
- 
- | Metric | Value |
|-------------|-------|
| Engine RPM | 640 |
| Fuel Rate | 0.5 |
| Engine Temp | 179 |
| HEX Temp | 65 |
| Oil PSI | 42 |
| Fuel PSI | 53 |
| Alt Volt | 13.8 |
| Fuel Level | 67 |

Pulling Vessel Data

Browser
Based

iPhone Safari

- \$PCDIN_01E113_1E3C2304,0
A,6713 FFF*24
- \$PCDIN_01E113_1E3C2304,0
A,6713 FFF*24
- \$PCDIN_01E113_1E3C2304,0
A,6713 FFF*24
- \$PCDIN_01E113_1E3C2304,0
A,6713 FFF*24
- \$PCDIN_01E113_1E3C2304,0
A,6713 FFF*24



Pushing Vessel Data

1

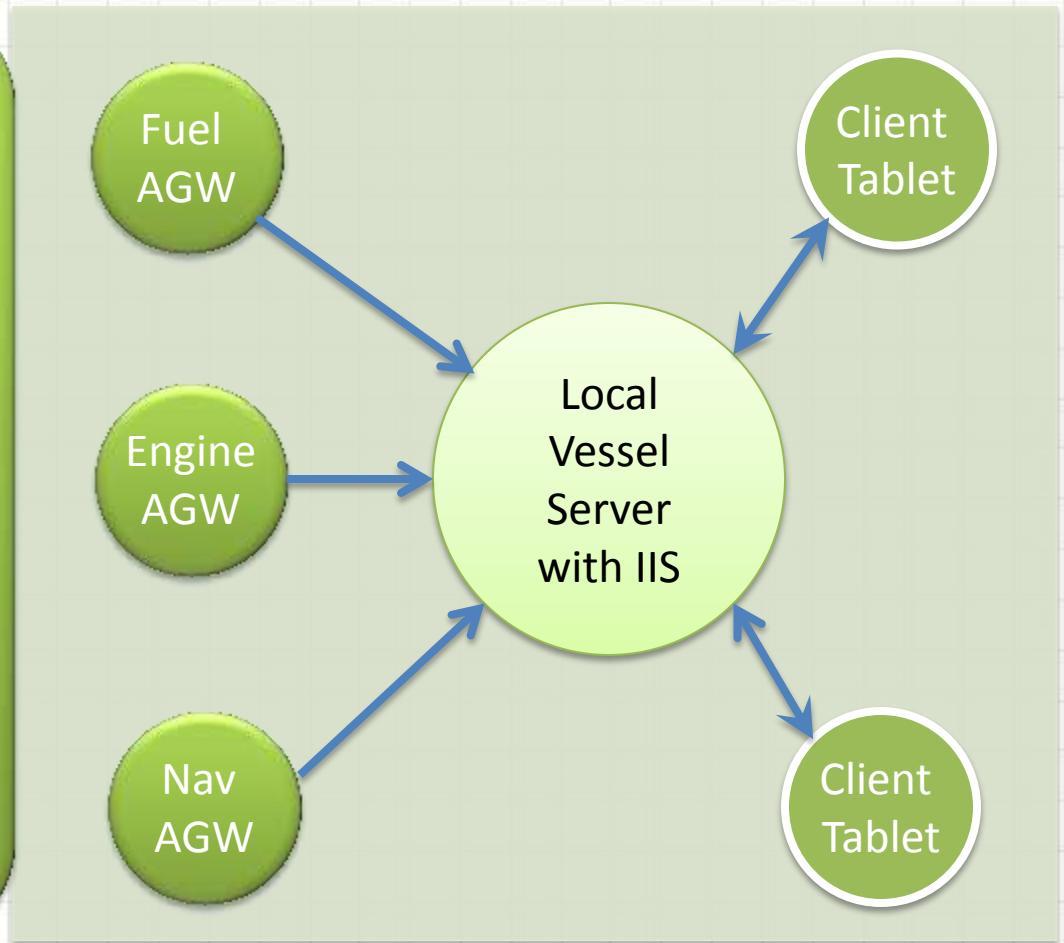
- Push to Local Server

2

- Push to Internet Server

Pushing Vessel Data

Push to
Local
Server



Pushing Vessel Data

Push to
Local
Server

- **Vessel Based**
 - Infrastructure Network
 - Single connection point
 - Supports many clients
 - No Internet Required
 - Simple to set-up
- **Local Storage**
 - Data log and Retrieve
 - Always available at sea
- **WiFi via Router/AP**
 - Wireless 300 ft range

Pushing Vessel Data

Push to
Local
Server

- **Analog Gateways**
 - Autonomous HTTP POST
 - Network Connectivity
 - NMEA 2000
 - Ethernet
 - WiFi
 - Multiple analog inputs
 - Browser Interfaces
 - Management
 - Sensor Configuration

Pushing Vessel Data

Push to
Local
Server

The screenshot shows the SeaSmart.Net Ethernet Module configuration interface. A configuration table is overlaid on the page, detailing the settings for pushing vessel data to a local server.

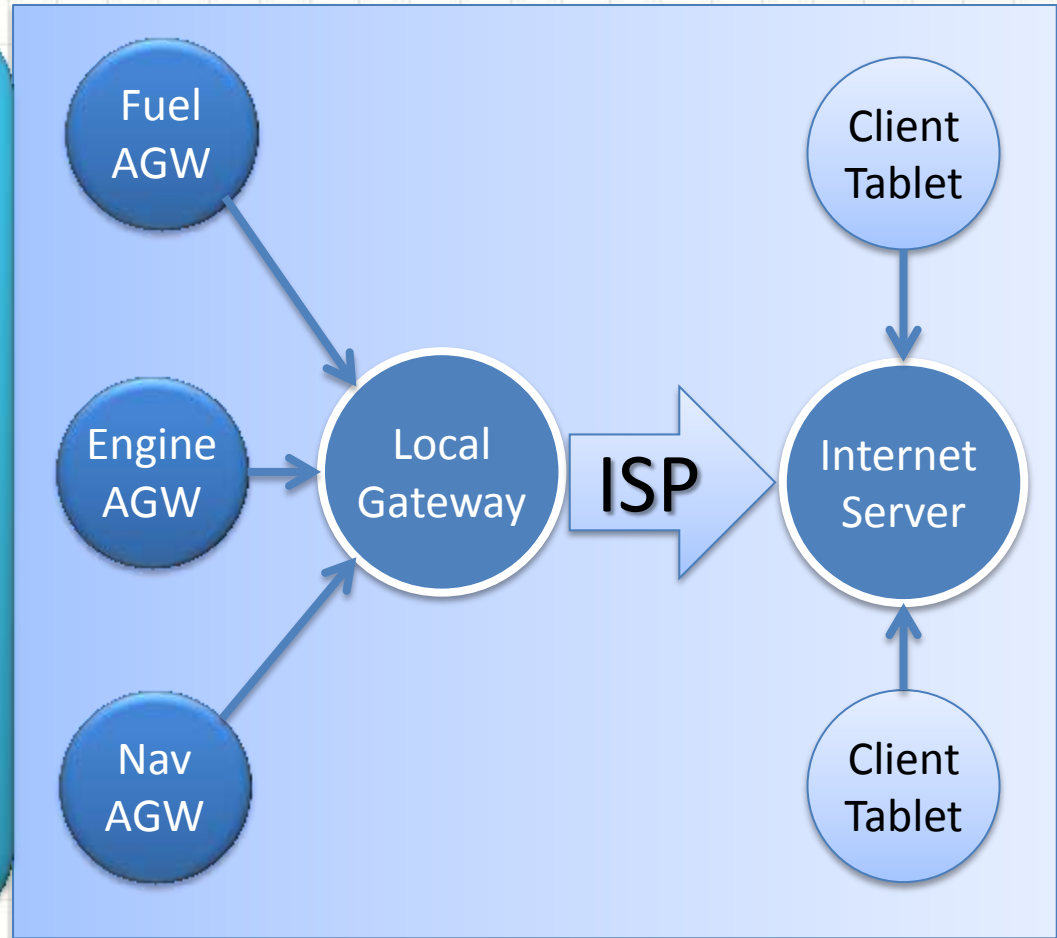
Local Port:	<Random>
Host 1:	192.161.0.1/Web/PostServerData.asp:80, TCP, 45000 msec
Host 2:	<None>

Below the table, the configuration page shows various settings for the tunnels:

- Reconnect Timer: 15000 milliseconds
- Flush Serial Data: Enabled Disabled
- Block Serial: Enabled Disabled
- Block Network: Enabled Disabled
- Email on Connect: <None>
- Email on Disconnect: <None>
- CP Output: Group

Pushing Vessel Data

Push to
Internet
Server



Pushing Vessel Data

Push to
Internet
Server

- **Connect Multiple Sensors**
 - Common bus (Ethernet)
 - Utilize Gateways to bridge protocols (NMEA 2000/0183)
- **Simple Setup**
 - Uses ISP Gateway
 - Minimal Security risks
 - Minimized Hardware
- **Global Access**
 - 24/7 Servers
 - Cloud data storage/retrieve

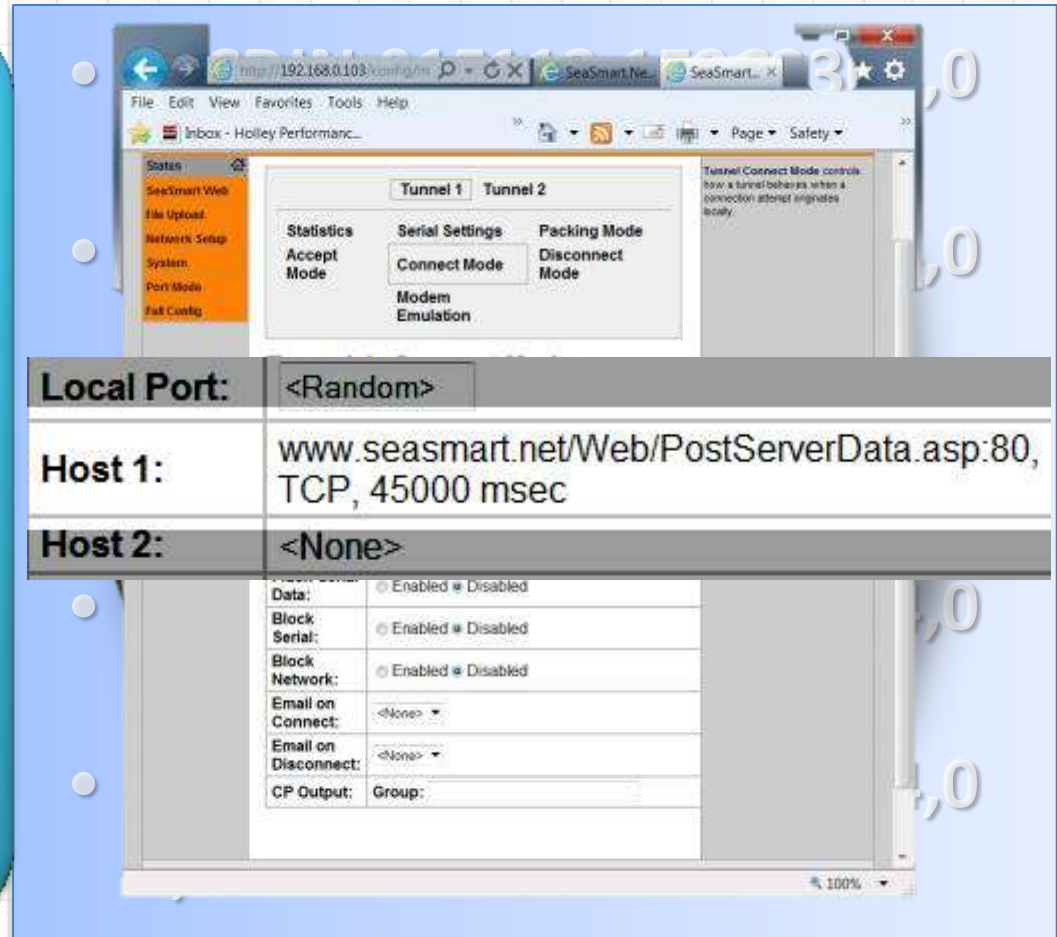
Pushing Vessel Data

Push to
Internet
Server

- **Gateways push data directly**
 - No local Server required
 - Outbound traffic is minimal security risk
 - Cloud data storage enhances availability and analysis
 - Local network is hidden from public access
 - Browser Management/
Configuration

Pushing Vessel Data

Push to
Internet
Server



The screenshot shows the SeaSmart Web configuration interface. The browser address bar displays `http://192.168.0.103/config/m...`. The page title is "Inbox - Holley Performanc...". The interface includes a navigation menu on the left with options like "SeaSmart Web", "File Upload", "Network Setup", "System", "Port Mode", and "Full Config". The main content area is divided into "Tunnel 1" and "Tunnel 2" sections. Under "Tunnel 1", there are tabs for "Statistics", "Serial Settings", and "Packing Mode". The "Serial Settings" tab is active, showing options for "Accept Mode", "Connect Mode", "Disconnect Mode", and "Modem Emulation". Below the tunnel settings, there are three rows of configuration fields:

Local Port:	<Random>
Host 1:	www.seasmart.net/Web/PostServerData.asp:80, TCP, 45000 msec
Host 2:	<None>

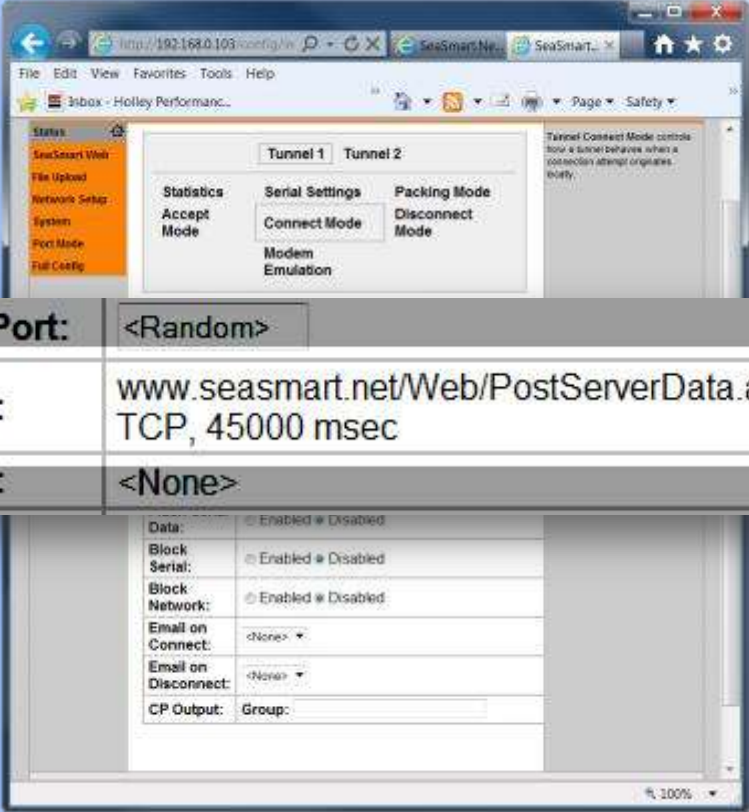
Below these fields, there are several checkboxes and dropdown menus for data output settings:

Data:	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled
Block Serial:	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled
Block Network:	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled
Email on Connect:	<None>
Email on Disconnect:	<None>
CP Output:	Group:

The interface also includes a "Tunnel Connect Mode controls" section on the right, which explains that a tunnel behavior when a connection attempt originates locally. The bottom right corner shows a zoom level of 100%.

Pushing Vessel Data

Push to
Internet
Server



The screenshot shows the SeaSmart Web interface in a browser window. The URL is <http://192.168.0.103/setting/>. The interface includes a sidebar with navigation options like 'SeaSmart Web', 'File Upload', 'Network Setup', 'System', 'Port Mode', and 'Full Config'. The main content area is divided into 'Tunnel 1' and 'Tunnel 2' sections. Under 'Tunnel 1', there are tabs for 'Statistics', 'Serial Settings', and 'Packing Mode'. The 'Serial Settings' tab is active, showing options for 'Accept Mode', 'Connect Mode', 'Disconnect Mode', and 'Modem Emulation'. Below the browser window, a configuration table is overlaid, detailing the settings for pushing data to an internet server.

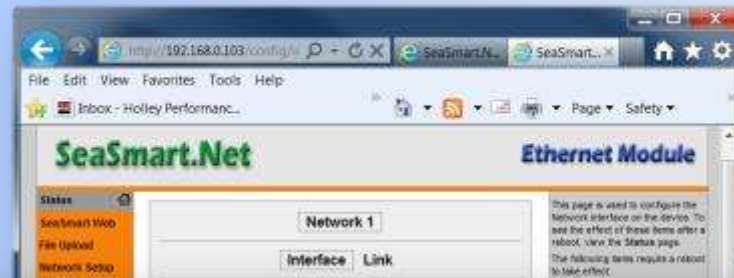
Local Port:	<Random>
Host 1:	www.seasmart.net/Web/PostServerData.asp:80, TCP, 45000 msec
Host 2:	<None>

Below the table, there are additional configuration options:

- Data: Enabled Disabled
- Block Serial: Enabled Disabled
- Block Network: Enabled Disabled
- Email on Connect: <None>
- Email on Disconnect: <None>
- CP Output: Group: _____

Pushing Vessel Data

Push to
Internet
Server



DHCP Client:	<input type="radio"/> On <input checked="" type="radio"/> Off
IP Address:	<input type="text" value="192.168.0.103"/>
Default Gateway:	<input type="text" value="192.168.0.254"/>
Hostname:	<input type="text" value="SeaSmart"/>



Summary

1

- Getting Data to your Tablet

2

- Pulling Vessel Data

3

- Pushing Vessel Data

Summary

Getting Data to Tablets

- **Point to Point**
 - Single Sensor
 - Single User/Tablet
 - Short Distance
 - High Node Cost
 - Custom App/Protocol
 - NMEA 0183 support
 - Depth/Fuel/Weather/GPS

Summary

Getting
Data to
Tablets

- **Ad Hoc Network**
 - Wireless 802.11 b/g
 - Multi User
 - Simple Set-Up
 - Requires a Gateway to convert NMEA 2000/0183 to TCP/IP
 - Can support networked Sensors
 - Analog Gateways with WiFi
 - Requires TCP/IP Client App
 - Low Cost

Summary

Getting Data to Tablets

- **Infrastructure Network**
 - Wired Ethernet is faster/reliable
 - Central Router with WiFi AP
 - Supports Internet connection via Gateway and ISP
 - Requires a Gateway to convert NMEA 2000/0183 to TCP/IP
 - Supports Networked Sensors
 - TCP/IP Client App or Browser
 - More Complex Setup/Cost

Summary

Pulling Data

- **App Based**
 - Vendor Specific Protocol Support
 - NMEA 2000/0183/Proprietary
 - Platform Dependent
 - (iPad/PC/Android)
 - High Performance
 - Data rendered locally
 - Client controlled connection (TCP)
 - Allows access over the Internet
- Restricted Development Environment

Summary

Pulling Data

- **Browser Based**
 - Open Protocol Support
 - NMEA 2000/0183/Proprietary
 - Platform **In**dependent
 - (iPad/PC/Android)
 - Medium Performance
 - Data rendered in JAVA/HTML
 - Server controlled connection (HTTP)
 - Allows access over the Internet
- Open Development Environment

Summary

Pulling
Data

- **Internet Access Requirements**
 - NAT Required for Internet (inbound)
 - Router must be configured for Port Forwarding
 - Static IP Address Assignments
 - Discover server IP address (DNS)
 - High Security Enabled
 - Block unwanted inbound traffic
 - ISP dedicated Gateway IP Address = \$
 - Additional AP costs involved
- Complex to Configure/Maintain

Summary

Pushing Data

- **Using Local Servers**
 - Increased Equipment Costs
 - Server H/W and OS
 - Eliminates Internet access
 - Utilizes Analog Gateways
 - Browser Based access
 - Platform independent
 - Always available
 - Local data storage/retrieve
 - Supports multiple clients

Summary

Pushing
Data

- **Using Cloud Servers**
 - Minimizes Equipment Costs
 - Simplifies local network
 - Leverages Distributed computing/data storage
 - Browser Based Access
 - Platform Independent
 - Robust and Expandable
 - Provides Global Access
 - Internet
 - Cloud Servers

Summary

Pushing Data

- **Internet Access Requirements**
 - Local Gateway IP address
 - Provided by ISP equipment
 - DNS must be configured
 - Internet Domain Name Servers
 - Minimal Security Required
 - Only Outbound requests
 - No local server required
 - Minimum Equipment costs
- Simple to Configure/Maintain



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WWW.SEAGAUGE.COM

WWW.SEASmart.NET

WWW.DIGITALMARINEGAUGES.COM



POWER POINT PRESENTATION ONLINE AT

www.seasmart.net/pdf/IBEX2012PP.pptx

and

www.seasmart.net/pdf/IBEX2012PDF.pdf



QUESTIONS?

DEMOS?