

LANTRONIX
CONNECT SMART. DO MORE.

acal bfi
European leader in
advanced technology solutions

Overcoming the challenges of Wi-Fi enabling your product



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WHY CONNECT?

Standardization

Moore's Law

Open source

Self-service

Automation

Scale

Cloud
computing

Mobility

Smartphones / tablets

Internet of Things

Wireless

App stores

Browsers

Web-by languages

DevOps

NoSQL

Analytics

Scale-out storage

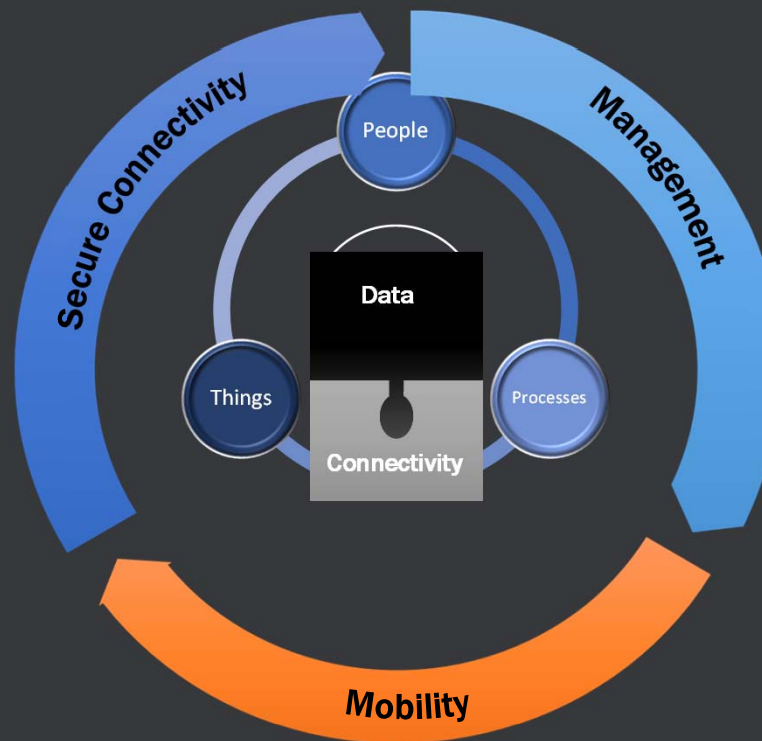
Data vs models

Big
data

WHY CONNECT?

BRINGING ABOUT THE INTERNET OF THINGS

- New business opportunities and revenue models
 - Shortened time-to-market
 - Realized ROI on R&D
- Effective utilization of enterprise assets
- Employee productivity gains
- Improved customer experiences and retention
- Improvement in process efficiencies
 - Secure Connectivity
 - Mobility
 - Analytics



Secure Connectivity

- Certificate Management
- Enterprise WLAN Security
- FIPS 140-2 Compliance
- SSL/TLS
- Identity and Access



Management

- Web Services API
- OTA Firmware Upgrades
- Zero Touch Provisioning



Mobility

- Direct mobile device access
- Mobile friendly WebService APIs
- Libraries for Quick Provisioning
- Sample

WHY CONNECT?



New revenue
opportunities



Differentiate
from the
competition



Reduce support
costs



Liberate your
data

HOW TO CONNECT?

'Global Wi-Fi network', the fastest growing network



Urge for mobile access and free services

WHAT WORRIES KEEP ENGINEERS UP AT NIGHT

#1 Time to market continues to shrink

#2 Keeping skills up to date

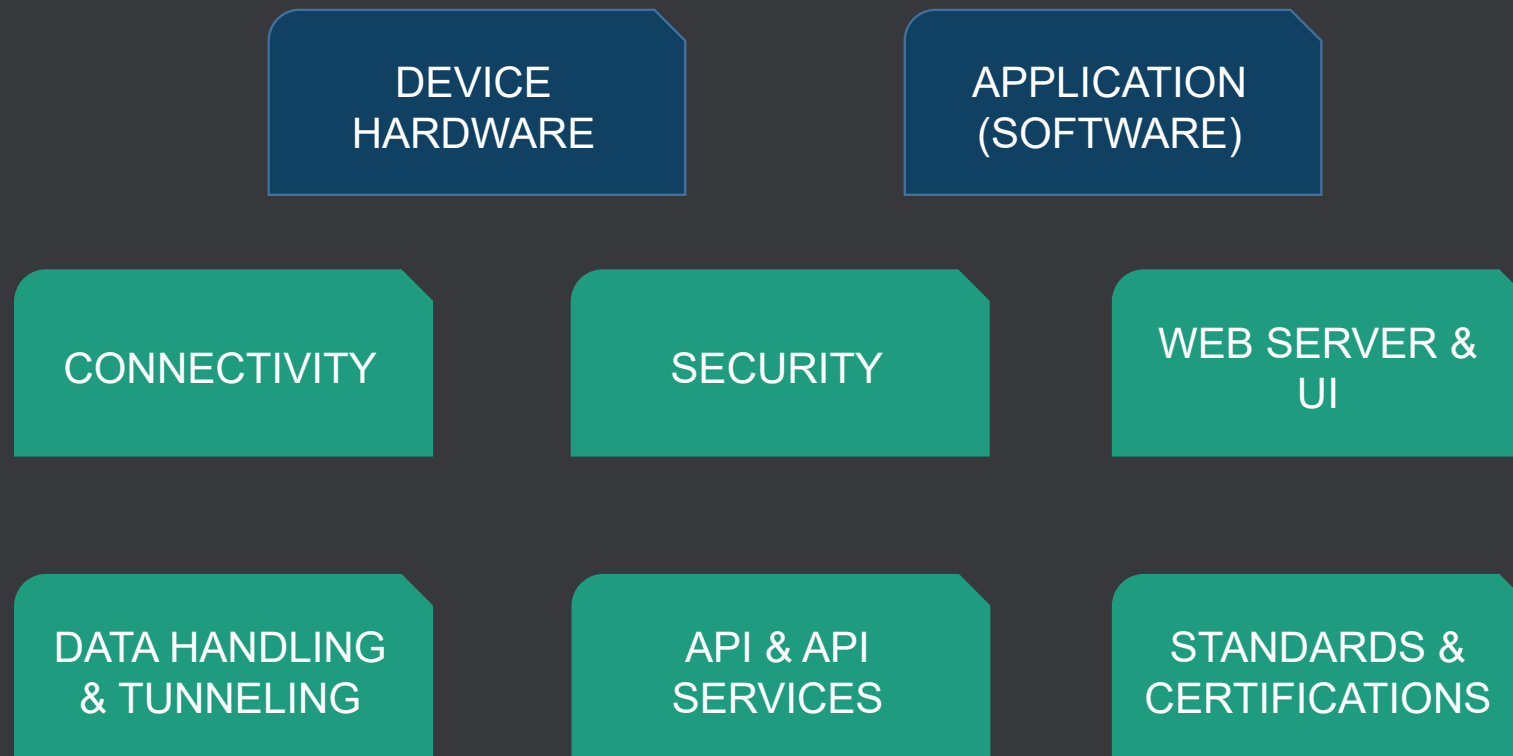
#3 Fewer engineers and smaller design teams

#4 Keeping current with latest design trends

Plus ROI, security, management, mobility...



IOT DEPLOYMENT COMPONENTS



DIY vs EMBEDDED IOT GATEWAY

DO IT YOURSELF

ALL THE GLORY
AND
ALL THE HEADACHES

EMBEDDED IOT
GATEWAY

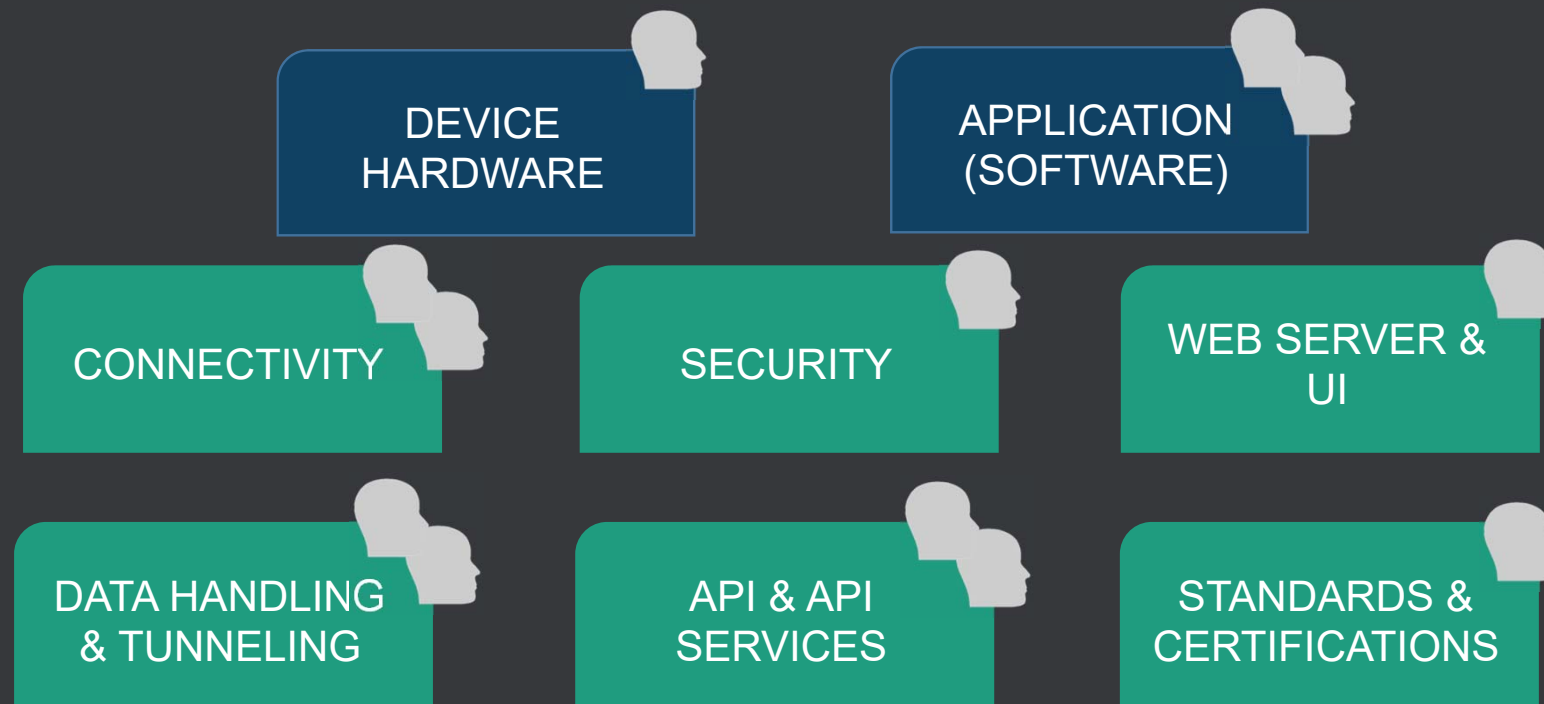
ALL THE GLORY
(in less time and without a
lot of the headache)

THERE IS ANOTHER WAY

WITH EMBEDDED IOT GATEWAYS

DO-IT-YOURSELF (DIY) IOT DEPLOYMENT

12 ENGINEERS x \$150K = \$1.8M DIY DEVELOPMENT



BUSINESS CONSIDERATIONS WHEN GOING WITH DIY APPROACH



**Requires broader
team resources &
skill diversity**



**Time to market
implications**



**Business risks &
opportunity costs**



**Post launch
ongoing support
& maintenance
costs**

ONE STUDY ESTIMATED THAT POST-LAUNCH SUPPORT & DEVELOPMENT COSTS CAN BE NEARLY DOUBLE OR MORE INITIAL PRODUCT DEVELOPMENT. (Source: WindRiver)

COLLAPSE IOT DEPLOYMENT TO THREE STEPS

**DESIGN YOUR
MACHINE**



**DESIGN THE BEST
USER EXPERIENCE**



**GET CONNECTED WITH
EMBEDDED IoT
GATEWAYS**

EMBEDDED IOT GATEWAY DEPLOYMENT

APPLICATION
(SOFTWARE)



EMBEDDED IOT GATEWAY
(CONNECTIVITY, SECURITY, WEB
SERVER & UI, DATA HANDLING &
TUNNELING, API & API SERVICES,
STANDARDS & CERTIFICATIONS)

MACHINE

WITH THE EMBEDDED IoT APPROACH
YOU CAN

- Spend more time innovating
- Offload the headaches of dealing with the complexities of Wi-Fi deployment
- Go to market faster
- Reduce your business risk

EVALUATING EMBEDDED IOT GATEWAY SOLUTIONS

QUALIFY

- ❑ Supplier reputation, roadmap and support
- ❑ Regulatory certification, homologations (modular RF) and industry certifications (Wi-Fi Alliance)
- ❑ Specifications
 - ❑ Radio specifications (2.4 and/or 5GHz, 802.11 ac, beamforming,)
 - ❑ Choice of Machine Integration Interface (UART, USB, Ethernet, SPI, BT(LE))
 - ❑ Software suite:
 - ❑ Soft AccessPoint
 - ❑ OverTheAir update
 - ❑ Data Tunneling
 - ❑ Building blocks for standard connectivity functionality
 - ❑ Physical dimensions, Form Factor, Industrial Temperature

EVALUATING EMBEDDED IOT GATEWAY SOLUTIONS

INTEGRATE

- ❑ Complete Wi-Fi and Network Services (not just TCP/IP) Offload
- ❑ Automatic Network Connectivity Management, No Coding Turnkey Applications
- ❑ Connected Device Lifecycle Management (Firmware, Configuration)
- ❑ Integrated Security (Authentication, Authorization, and Encryption)
 - ❑ Enterprise Wi-Fi Security, End-to-End Application Security, Data-at-Rest and Data-in-Motion Security

DEPLOY

- ❑ Simplified Machine Onboarding - Manufacturing and Deployment
- ❑ Hardened and Production Ready Software Stack (not application samples)

Why 802.11ac for Wi-Fi IoT Devices

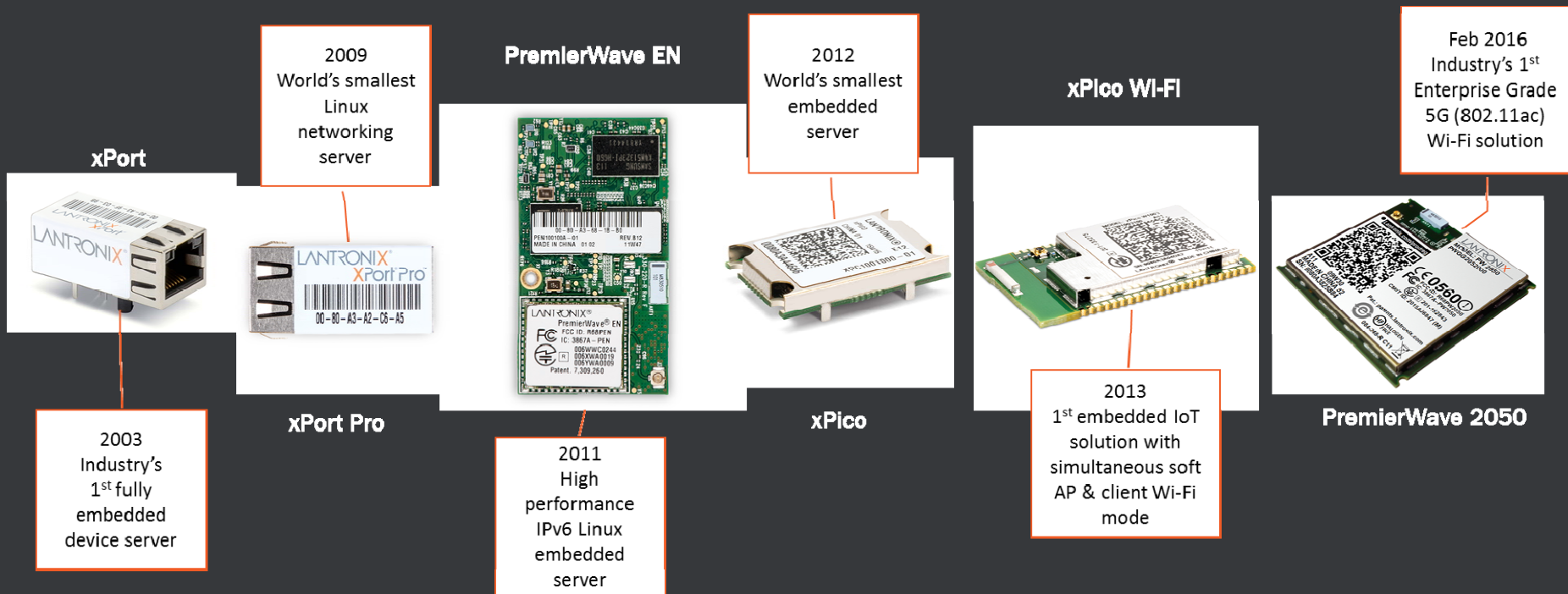
Enterprise Networks are already deploying 802.11ac networks

This will only grow in the next few years

- Operates in 5GHz
 - Less Congestion than 2.4 GHz
 - Less Interference from other non-Wi-Fi devices (Microwaves, BT, etc.)
 - More Non-Overlapping Channels – Higher Density of Users/Clients per AP
- Support for 256-QAM modulation
 - For 1x1 spatial streams - 33% improvement in supported data rates
- Beamforming is standard for 802.11ac
 - Directing energy from sender towards a specific receiver
 - Improves Overall Range for wireless client – due to improved signal-to-noise ratio

LANTRONIX: CONNECTING MACHINES FOR MORE THAN 25 YEARS

1998: Lantronix introduced the world's first integrated board level embedded device server



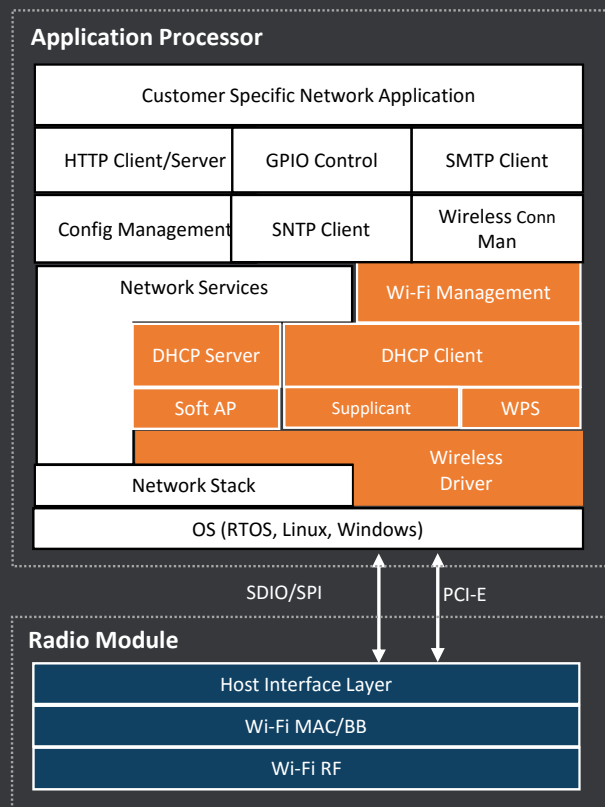
Lantronix technology Value Proposition

- Leading provider of embedded and external IoT gateway solutions
- Millions of devices connected worldwide
- Focused on delivering secure data access and management to industrial machines and devices
- Production Ready Solutions
 - Simple and easy to use
 - Short time to revenue
 - Low Risk/High Quality devices
 - » Industry Leading Warranty
 - » No RF engineering experience required
 - » Product Longevity
- Optimized hardware for M2M applications supporting IoT
- Software Rich
 - Network Services Offload Engine
 - Application Suites
 - Security
 - Robust and hardened BSP
 - Module Certified



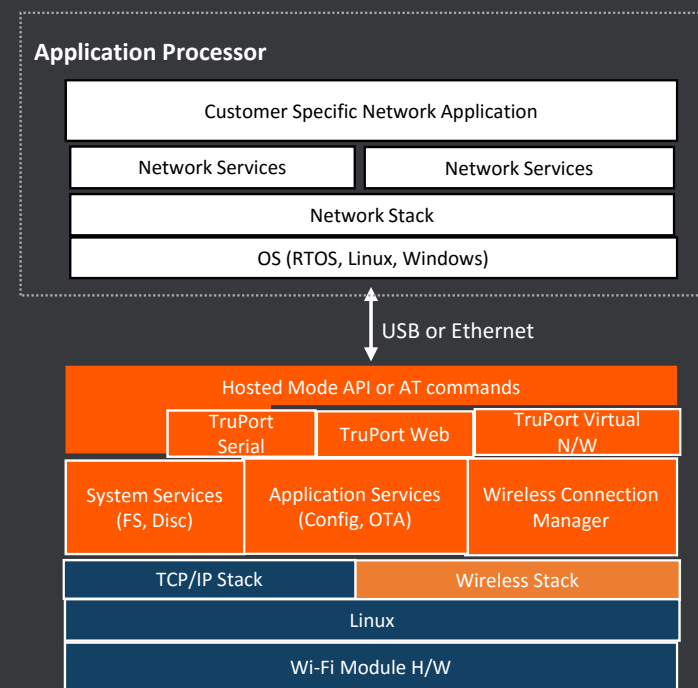
Overall Low Cost of Ownership

WiFi INTEGRATION OPTION - Hosted Mode



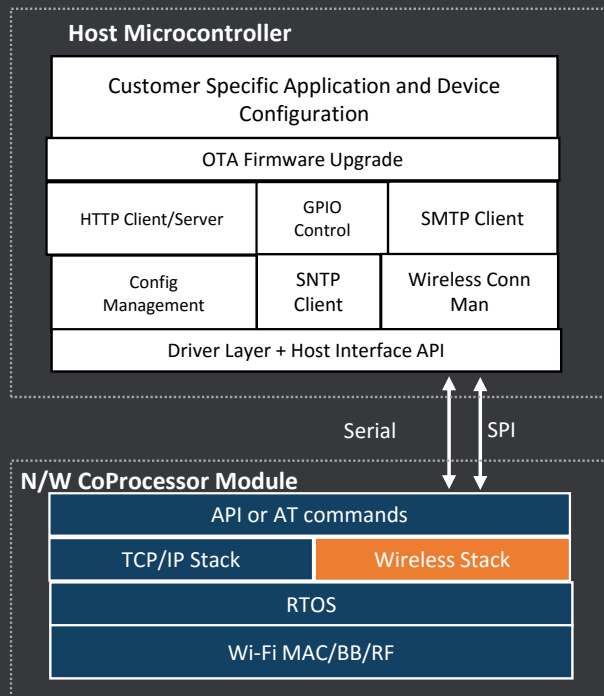
Radio Only Module

Hosted Mode Wi-Fi Stack Offloaded

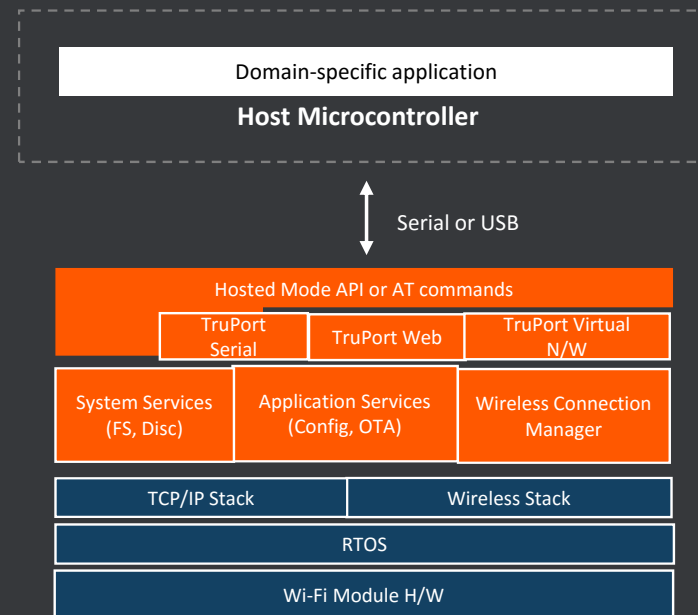


Lantronix Wireless Embedded Solution

WiFi INTEGRATION OPTION - Hosted Mode

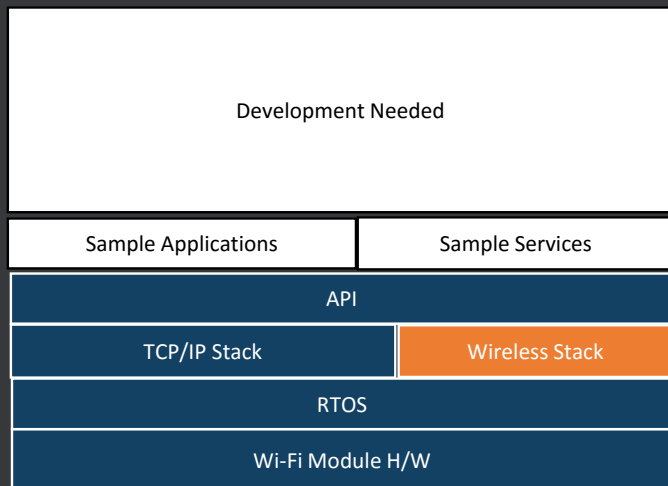


Conventional Wi-Fi Modules

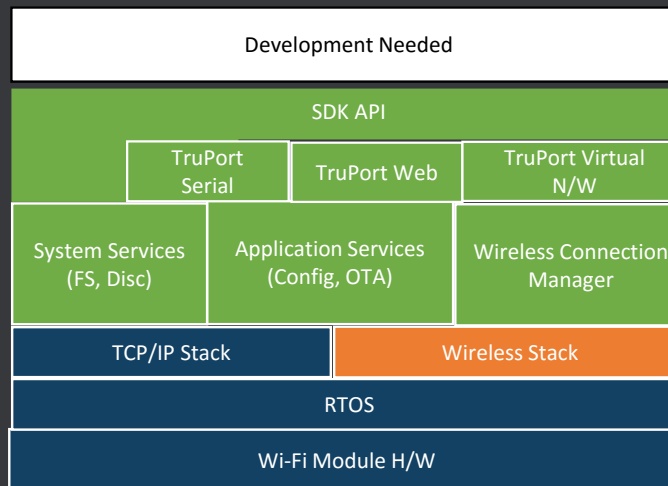


Lantronix Embedded Wireless Solutions

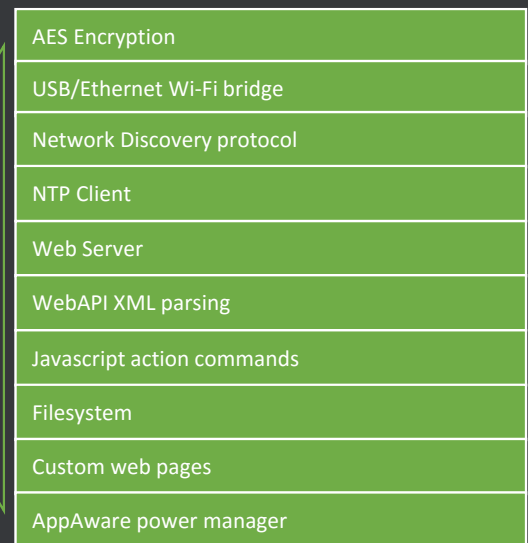
WiFi solution HOSTLESS MODE



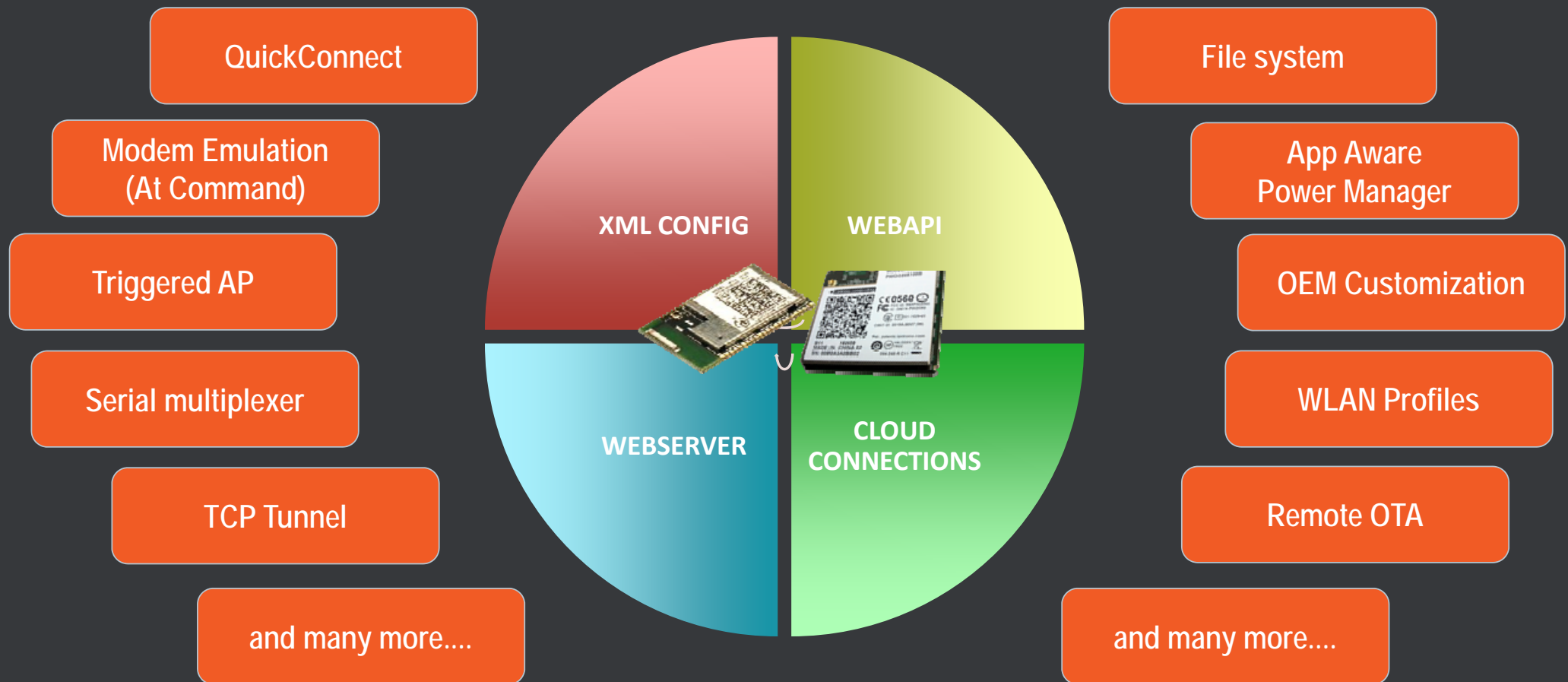
**WICED Modules
Other Wireless MCU**



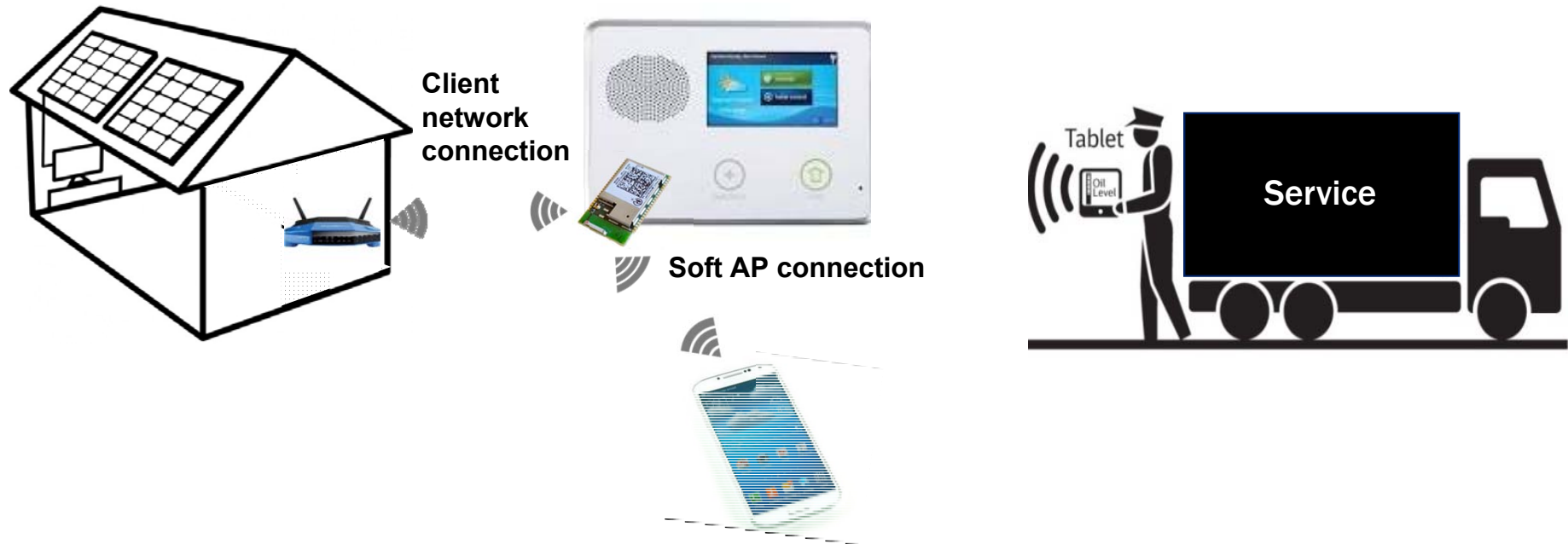
**Lantronix SDK
Go "Beyond WICED"**



WiFi GATEWAY BUILDING BLOCKS



WiFi Simultaneous SoftAP



- Connections from both interfaces can continuously access the device at the same time
- No reboot needed between AP and Client mode
- No access needed to client networks

WI-FI DETAILS PROVISIONING

How do you configure the details of the Access Point to connect to?

- A. Connect serial port and send a tech every time it changes;
- B. Add an LCD and keypad \$\$; or
- C. Use SoftAP!



SSID: example
Password:
passw0rd



PROVISION WI-FI: QUICKCONNECT

- Connect to an infrastructure network using QuickConnect
- Ability to use hex or passphrases

The screenshot shows the 'QuickConnect' section of the xPico Wi-Fi interface. The 'WLAN Profile "Lantronix_Guest"' is selected. The 'Connect To:' section displays the following information:

Field	Value
Network Name (SSID)	Lantronix Guest
BSSID	00:0B:85:52:FF:1B
Security Suite	WPA-TKIP
Signal Strength	-24 dBm

The 'Security Configuration' section shows the 'Key Type' set to 'Passphrase' (indicated by a radio button) and a 'Password' field. An orange arrow points to the 'Passphrase' radio button. Below this, there is an 'Advanced Configuration' section with 'Apply' and 'Submit' buttons. Another orange arrow points to the 'Submit' button.

On the right side of the interface, there is a 'WLAN Link Scan' section. It includes a 'Network name:' input field and a 'Scan' button. Below this is a table of detected networks:

Network Name	BSSID	Ch	RSSI	Security Suite
Lantronix_Guest	00:0B:85:52:FF:1B	1	-24 dBm	WPA-TKIP
Lantronix/VPA	00:0B:85:52:FF:1D	1	-25 dBm	WPA-TKIP
LantronixVoice	00:0B:85:52:FF:1C	1	-26 dBm	WEP
Mart	30:46:9A:F9:A9:03	3	-40 dBm	WPA2-CCMP
yader	C0:8A:DE:B1:0B:89	10	-44 dBm	WPA2-CCMP
wpa2_subha	C0:8A:DE:71:0B:8B	10	-44 dBm	WPA2-CCMP
wpa2_ki	C0:8A:DE:04:0B:8B	10	-44 dBm	WPA-TKIP

Text on the right side of the scan table: 'This page shows a scan of the wireless devices within range of the device. Up to 20 networks sorted by RSSI are shown. It reports: Network name (Service Set Identifier), Basic Service Set Identifier, Channel number, Received Signal Strength Indication and Security Suite. Click on any network name for QuickConnect configuration.'

LANTRONIX WebAPI

POST /export/status

Host: 192.168.0.1

Accept: */*

Accept-Encoding: gzip, deflate, sdch

Accept-Language: en-US,en;q=0.8,es-419;q=0.6,es;q=0.4

Authorization: Basic YWRtaW46UEFTU1dPUkQ=

Content-Length: 163

Content-Type: multipart/form-data; boundary=----WebKitFormBoundaryfyBLB2PPGjqKsxZu

-----WebKitFormBoundaryfyBLB2PPGjqKsxZu

Content-Disposition: form-data; name="optionalGroupList"

Interface: wlan0

-----WebKitFormBoundaryfyBLB2PPGjqKsxZu--

LANTRONIX EMBEDDED
IOT



TABLET/MOBILE
DEVICES



Standard HTTP request

LANTRONIX WI-FI WebAPI

- Change configuration
 - Send XML to /import/config CGI call
- View current status (signal strength, IP address, time, etc.)
 - HTTP request to /export/status CGI call
- Take actions like renew the DHCP address, or toggle GPIOs
 - HTTP request to /status/action CGI call

Included web server features reduce time to market, engineering expense

WLAN PROFILES

Can store connection details for multiple networks

Most other modules can only store one profile

- What happens to your embedded Wi-Fi solution if the device is moved from one floor of a building to another?
- Roams seamlessly, with other modules call IT to reconfigure each time the device is moved

The screenshot shows the 'xPico Wi-Fi' web interface by LANTRONIX. On the left is a sidebar menu with options: QuickConnect, Status, CPM, Clock, Device, Diagnostics, File System, HTTP, Line, Modem Emulation, Monitor, NTP, Network, Performance, SPI, Tunnel, Users, and WLAN Profiles (which is highlighted). The main content area is titled 'WLAN Profile Management'. It features a green status message: 'WLAN Profile Instance 4th floor has been created. The changes have been saved permanently.' Below this is a table with two columns: 'View or Edit' and 'Delete'. The table lists four profiles: 'testWEP', 'house' (with a Wi-Fi icon), 'Building East', and '4th floor'. Each profile has a checkbox in the 'Delete' column. To the right of the table is a text box containing instructions: 'This page allows view, edit, delete or creation of a WLAN Profile on the device. Select a profile for editing by clicking the page icon; this takes you to the Configuration web page. The icon indicates the active profile. Delete one or more profiles by checking their delete checkboxes. Create a new profile by entering a name in the text box. The new profile initially has default parameter values. When you name a new profile or check a box, the Apply and Submit buttons will appear. Use the Apply button to try out the changes without saving them to Flash. If the settings do not work, when you reboot the device, it will still have the original settings. Use the Submit button to both update the profiles and save them to Flash.' At the bottom of the interface, a copyright notice reads: 'Copyright © Lantronix, Inc. 2007-2014. All rights reserved.'

CUSTOMIZABLE WEB SERVER

Customize Lantronix pages

- Change images, CSS, hide menus
- Files needed can be overridden while maintaining Configuration Manager functionality

Create your own pages

- Add pages on sub-URL, or replace the index.html
- Use AJAX with Monitor or Mux to have active data update

The screenshot displays the xPico Wi-Fi web interface. The top header features the 'xPico Wi-Fi' logo on the left and the 'LANTRONIX' logo on the right. A left-hand navigation menu lists various system components: QuickConnect, Status (highlighted with an orange bar and a home icon), CPM, Device, Diagnostics, File System, HTTP, Line, Modem Emulation, Monitor, Network, Performance, SPI, Tunnel, Users, and WLAN Profiles. The main content area is titled 'Product Information' and contains several sections of configuration data:

Product Information	
Product Type:	xPicoWifi
Firmware Version:	1.1.0.2R10
Build Date:	Jan 11 2014 (17:48:18)
Serial Number:	0080A3980767
Uptime:	0 days 00:00:36
Permanent Config:	saved

Network Settings	
MAC Address:	00:80:A3:98:07:67
Interface ap0	
State:	Up
SSID:	XpicoWiFi_980767
Security Suite:	WPA2
IP Address:	192.168.0.1/24
Interface wlan0	
Connection State:	Connected
Radio Firmware Version:	2.3.1
Active WLAN Profile:	skynet
IP Address:	172.19.229.222/16
Default Gateway:	172.19.0.1
Hostname:	
Primary DNS:	172.19.1.1
Secondary DNS:	<None>

Line Settings	
Line 1:	921600, None, 8, 1, Hardware Tunnel
Line 2:	9600, None, 8, 1, None Command Line

Tunneling	Accept Mode	Connect Mode
Tunnel 1:	Waiting	Waiting
Tunnel 2:	Inhibited	Inhibited

At the bottom of the interface, a copyright notice reads: 'Copyright © Lantronix, Inc. 2007-2014. All rights reserved.'

FILESYSTEM

- Sufficient memory to store your custom web pages
- Files are stored in flash
 - Web pages served automatically at every reboot

The screenshot shows the 'File System Status' page of the xPico Wi-Fi interface. The left sidebar contains a menu with options: QuickConnect, Status, AES Credentials, CPM, Clock, Device, Diagnostics, Discovery, File System (highlighted), HTTP, Line, Modem Emulation, Monitor, NTP, Network, Power, SPI, Tunnel, Users, and WLAN Profiles. The main content area displays a table of file system statistics.

Property	Status
File System Size:	389120 Bytes
Available Space:	386480 Bytes
Clean Space:	379864 Bytes
Dirty Space:	6616 Bytes
Total Space Used:	2640 Bytes
Data Space Used:	2422 Bytes
Number of Files:	0
Number of Directories:	0
Number of System Files:	3
Current Bank:	A
	[Compact]
	[Format]

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The screenshot shows the 'File System Browser' page of the xPico Wi-Fi interface. The left sidebar is identical to the previous screenshot. The main content area provides tools for managing the file system.

File System Browser

From here you can browse and manipulate the entire file system. Directories can be created, deleted, moved, and renamed. A directory must be empty before it can be deleted. Files can be deleted, moved, renamed, and uploaded via HTTP. Note: Both the maximum file name and maximum path length are 100 characters. Note: The maximum directory depth is 6.

Created directory http.

Change Directory

Change

Create Directory

Create

Upload File

Choose File No file chosen
Upload

Copy or Move File

Source:
Destination:
Copy Move

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Turnkey Applications – TruPort Serial

- TruPort Serial (Serial Tunneling Application)
 - Robust serial to Wi-Fi application that supports transparent transport of hundreds of serial protocols over the network
 - Very suitable for hosted microcontroller applications with very little to no programming/development effort
 - Support RS232 serial and USB (CDC Serial and CDC ACM Device Classes)*
 - Advanced connectivity modes and configuration knobs to tune the connection parameters for a specific protocol without requiring custom software programming
 - Automatic and Manual connect modes
 - Inbound (Accept Mode) and Outbound (Connect Mode) connections
 - Modem emulation mode enables connecting to different servers using a standard AT command set
 - AES (128-bit, 192-bit, 256-bit) Encrypted session modes for secure tunneling

KEY QUESTIONS TO ASK

- Do you find yourself having to constantly qualify new radio modules and certify them within your solution?
- Is maintaining a secure and proven Wi-Fi connectivity solution with in-house resources core to your business?
- Do you intend to use mobile devices for field installation and support?
- Does your team have Wi-Fi experts to integrate the driver and wireless network stack?
 - Ongoing kernel and OS upgrades require specialized skills
 - Vendor provided reference drivers not in sync with your desired software revision of OS
 - Is a reference driver sufficient or would you rather work with production ready and field-proven Wi-Fi connectivity solution
- Is ongoing maintenance and support staff available to resolve WLAN deployment issues?
- Do you require additional certifications and homologations? Do you need to do this yourself?
- Have you considered the cost and time associated with certifications and homologations?
- Is extended operating temperature required in your application?
- What is expected product life-cycle?

Broadcom + Lantronix

EMBEDDED IOT GATEWAY SOLUTIONS



xPico Wi-Fi

- Broadcom BCM43362
- Wireless 802.11 b/g and IEEE 802.11n connectivity
- Simultaneous Soft AP and client mode
- Compact SMT (castellation) footprint: 26.1mm x 18.3mm x 3.0mm footprint
- Complete device server app with full IP stack and web server
- Zero host load eliminates the need for drivers and makes implementation easy and fast
- Industrial temperature range -40° to +85° Celsius
- Industry leading 5 Year Warranty



PremierWave 2050

- Broadcom BCM4339
- Industrial grade 802.11ac (5G) wireless connectivity
- Simultaneous SoftAP and Wi-Fi Direct modes
- Fully certified module mitigates regulatory and productivity availability risks
- Production ready software with compact footprint
- Service interface for simplifying provisioning, deployment and ongoing service
- Enterprise grade security
- Industrial temperature range -40° to +85° Celsius
- External IoT gateway version coming in Fall 2016
- Industry leading 5 Year Warranty

LANTRONIX

See this demonstrated at ACAL BFi stand # 26

