Legato™ open source embedded platform for M2M built on Linux 2015-03-11

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Supplier of Advanced Technology Solutions

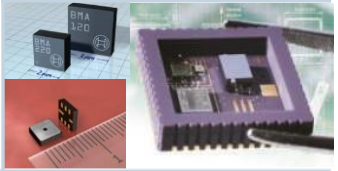
ACAL Group: 230 MGBP / 720 employees

ACAL BFi Nordic: 250 MSEK / 55 employees

M2M & Wireless

- 2G, 3G, 4G modules & gateways
- GPS/GNSS modules
- WiFi & Bluetooth modules
- Ultra Low Power Radio devices *(RFIC, SoC and Modules)*
- Antennas
- M2M / IoT Cloud
- Airtime / SIM cards

Sensors



- 3D, 6D, 9D sensors *(Accelerometer, Gyro, Magnet)*
- Temperature, Humidity, Pressure
- Force, Gas, etc…
- Sensor assemblies
- Rotary signal transmitters

Industrial display modules

- TFT-LCD, 4.3” to 19.2”
- Clear visibility in sunlight
- Industrial temperature
- Industrial life cycle

RF & uW, Frequency control

Embedded Computers

Fiber Optics

Photonics & Imaging

Electromechanical

Magnetics & Power

Our offering to the M2M/IoT & Embedded community

- Hardware, software and services from expert companies
- Full technical support for the products and services we offer
- Additional niche competence through partners

…Knowledge and Experience

We focus on our part !

A toolbox enabling short time to market

- Cellular 2G / 3G / 4G
- WiFi, Bluetooth, Ultra Low Power Radio
- Antennas, Sensors, Displays, Systems
- M2M Cloud and Airtime
- Partners / Eco system

SIERRA WIRELESS · proAnt · OriginGPS mini+mighty · AXSEM · CIRCUIT DESIGN, INC. · Honeywell · MITSUBISHI ELECTRIC · LANTRONIX · BOSCH · HECTRONIC an acal group company

+ SPECIALIST COMPETENCE NETWORK !

Sierra Wireless

Sierra Wireless is a global leader in M2M devices and M2M Cloud services

- Largest worldwide supplier of cellular M2M modules, 34% market share 2013 (ABI)
- Industry's most comprehensive offering of 2G, 3G, 4G-LTE & LTE-A devices

Founded in 1993

2014
Revenue: $ 549 million
EBITDA: $ 35.4 million
Cash: $ 207 million
Debt: 0

Publicly listed:
NASDAQ (SWIR)
TSX (SW)

Over 100 million cellular M2M modules shipped

Approx. 950 employees worldwide
Customers in 130+ countries

Linux-Based Open Source Embedded Platform for M2M

March 11, 2015

SIERRA WIRELESS®

A Look at the Industry

- No M2M tailored Linux distribution
- Do-it-yourself Linux is complex to setup, create, and maintain
- 54% of developers are considering using Linux*
- Availability of full source code was the #1 consideration when selecting an operating system*

WHY LEGATO?

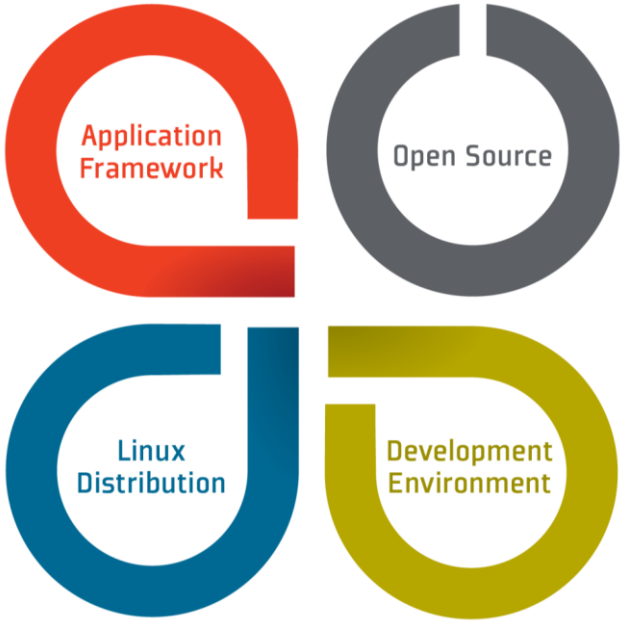
Need for Simplicity

Demand for Linux-based solution in Open Source

*According to a 2013 Embedded Market Study, UBM Tech, Embedded Systems Conference

Open Source Embedded Platform Built on Linux

Designed to **simplify** embedded M2M development



Legato™

Ready-to-run
Integrated, tested, validated

Ready-to-build
Open source, flexible foundation

Ready-to-connect
Any cloud, network, peripheral

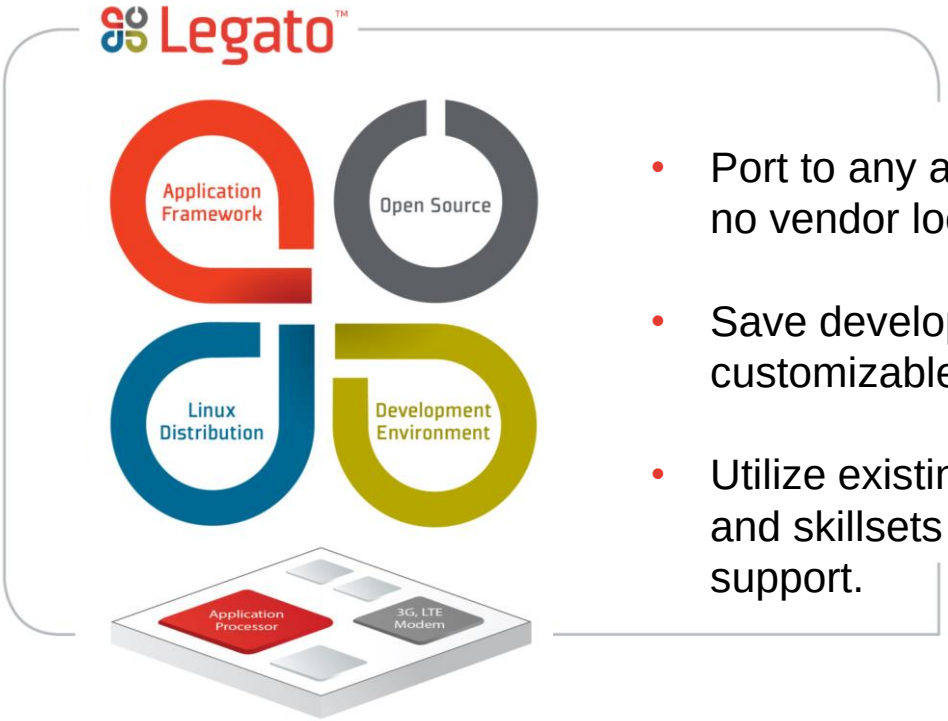
Ready-To-Run

Integrated, tested, validated to work out of the box

- Get started immediately with no porting required for AirPrime® AR and WP smart modules.
- Accelerate development with the tightly integrated application framework, Linux distribution, and development environment.

Ready-To-Build

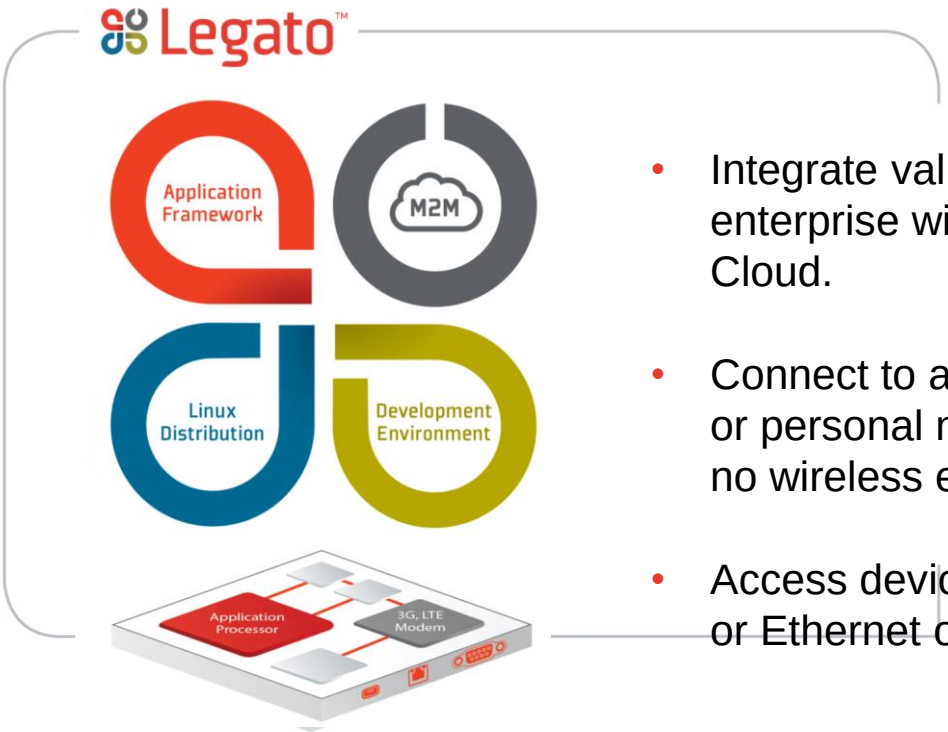
Open, flexible foundation to future-proof software investments



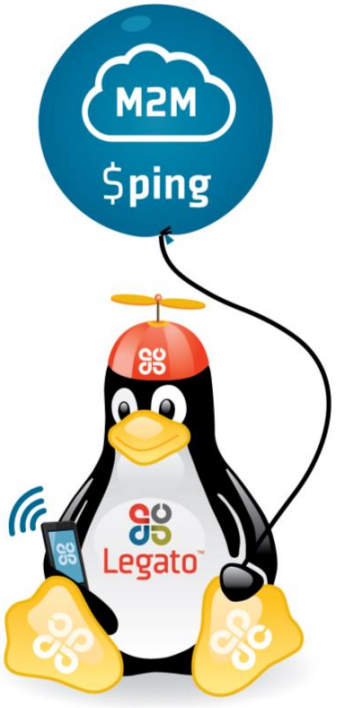
- Port to any application processor, no vendor lock-in.
- Save development time with customizable components.
- Utilize existing software and skillsets with multi-language support.

Ready-To-Connect

Any cloud, any network, any peripheral

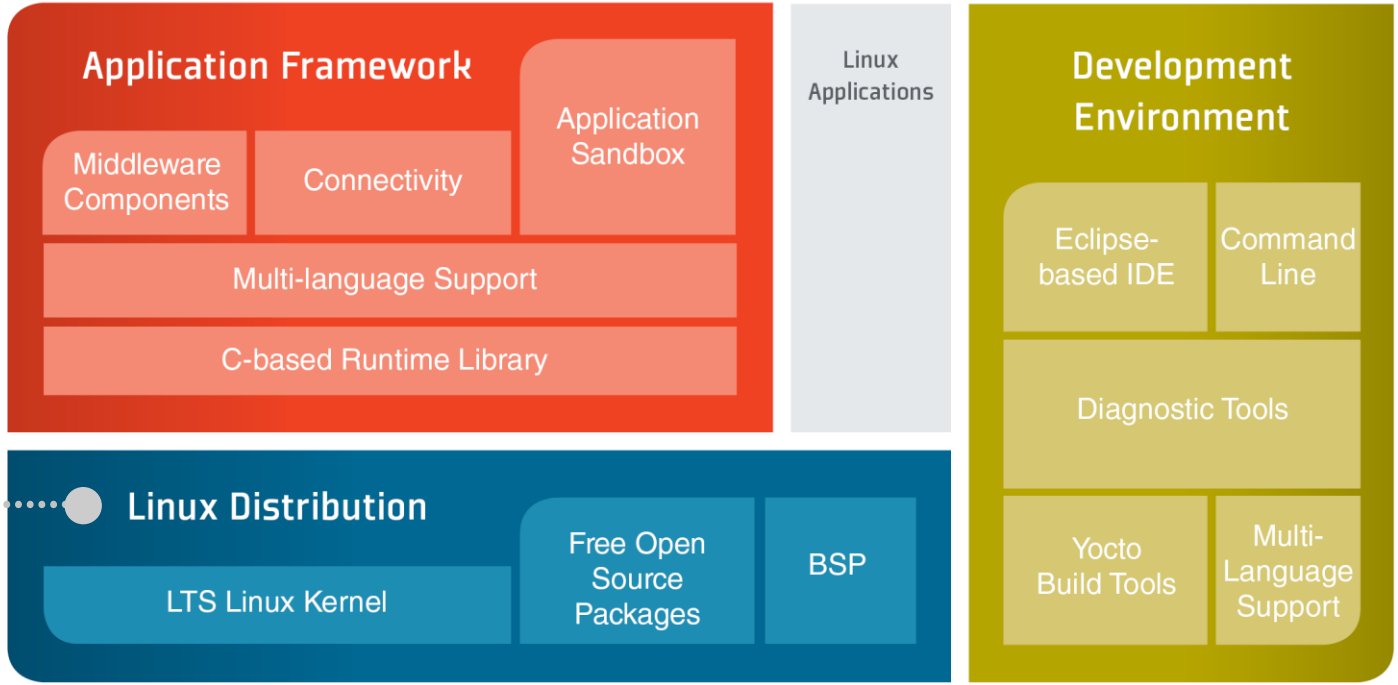


- Integrate valuable device data to the enterprise with the AirVantage® M2M Cloud.
- Connect to any mobile, wired, or personal network with no wireless expertise required.
- Access device peripherals like USB or Ethernet out-of-the box.



Components of the Legato Platform

Giving embedded M2M development a head start



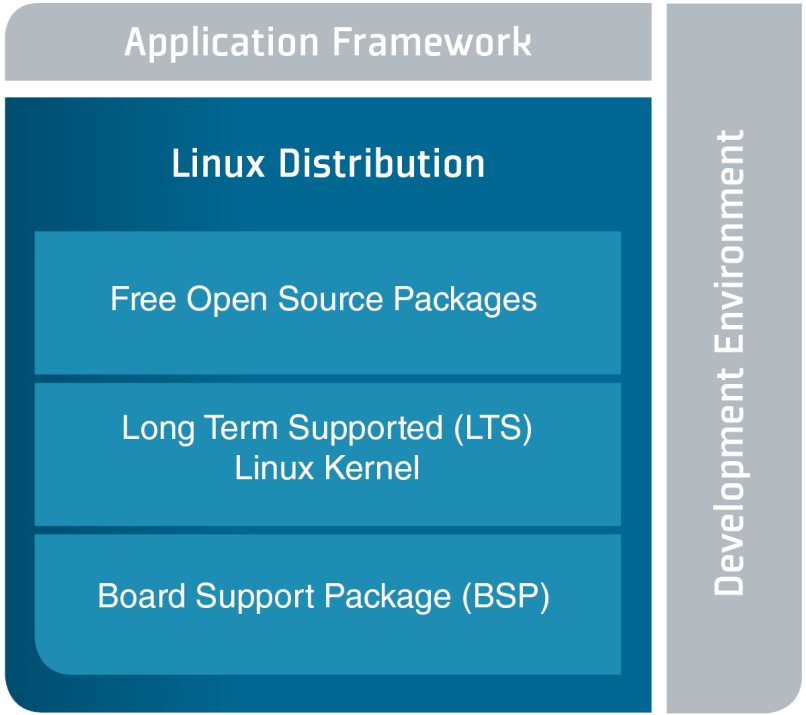
Legato™

built with Wind River

SIERRA WIRELESS

Fully Tested Linux Distribution from Wind River

Customizable with built-in M2M features



- **Free open source packages** - validated by the Linux Foundation's Yocto project and include packages like BusyBox, OpenSSL, DHCP, PPP, and OpenSSH.
- **Long-term supported Linux kernel (LTSI) -** hosted by the Linux Foundation and maintained by the embedded systems industry.
- **Board support package (BSP)** - enables hardware interfaces and power management, validated on AirPrime WP and AR smart modules.

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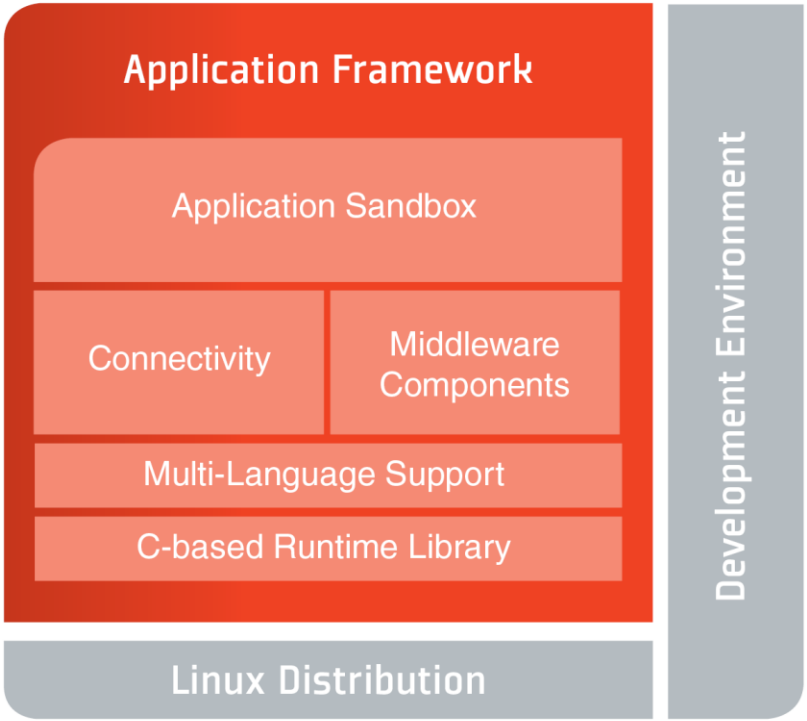
Tightly Integrated Application Framework

Designed with security and connectivity in mind



- **Application Sandbox** - secure environment to run and control multiple applications.
- **Robust Connectivity APIs** - access to cloud and network services such as voice calls, SMS, data, and radio controls.
- **Customizable middleware components** - validated building blocks such as configuration, database, logging, resource arbitration, and secure IPC.
- **Multi-language support** – utilize embedded applications in different programming languages.**
- **C-based runtime library** – fast, efficient system designed to maximize processing power and user application space.

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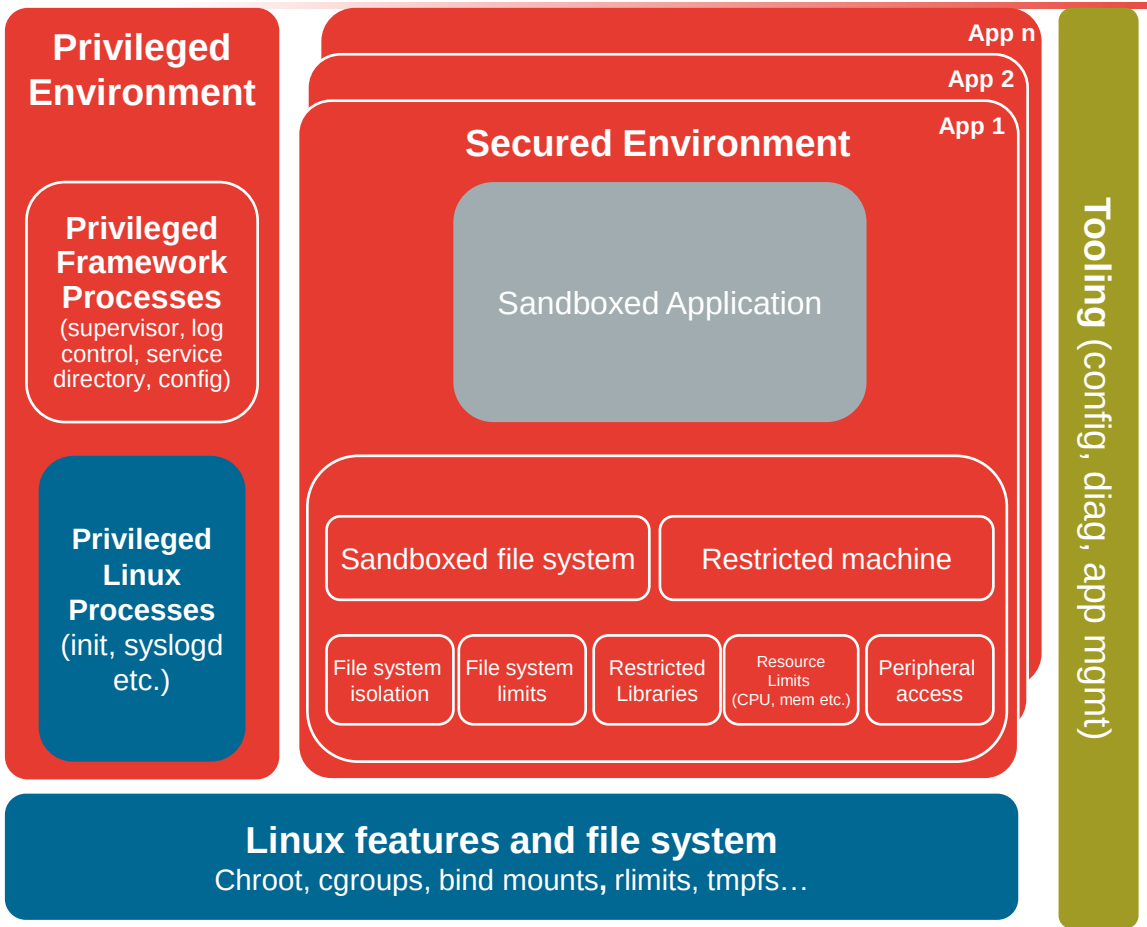
**Beta release supports C and C++. More dynamic language support to follow in 2015.

Application Sandbox



Legato privileged processes

- Supervisor – manages all other processes
- Service Directory – advertises services and connects authorized clients to services
- Log control daemon – allows dynamic control of the logging levels and output types
- Configuration DB – provides a central repository to configure the whole device

Each application has a unique userid

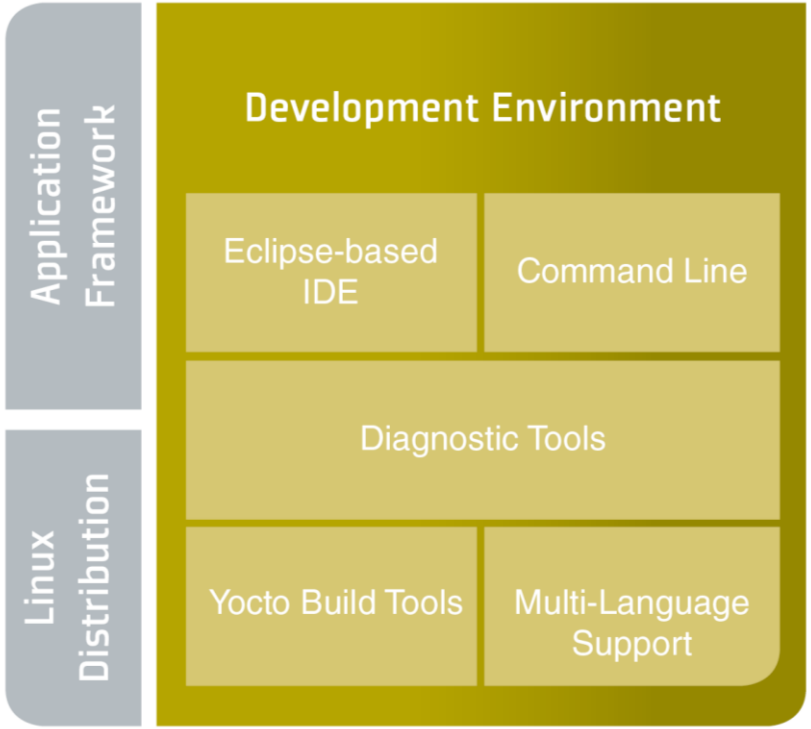
- These are created by the Supervisor on-demand and are destroyed when the application is removed.

Applications are in jail

- The app can only see its own part of the file system
- It is not possible for the application to access unauthorized files or services
- Applications run with the lowest possible privileges

Feature-Rich Development Environment

Flexible to simplify application level development



- **Eclipse-based integrated development environment (IDE)** - extensible and familiar toolset for application-level development with built-in API awareness.
- **Command Line** - automate builds and integrate into any tool chain.
- **Robust diagnostic tools -** local and remote debugging, troubleshooting, monitoring, and profiling.
- **Yocto build tools** - rebuild and tailor the Linux distribution for any project.
- **Multi-language support** - code using your favorite programming language.

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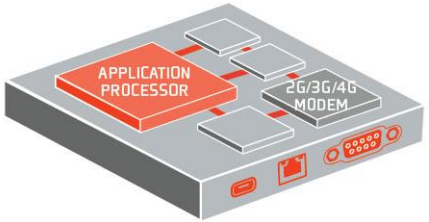
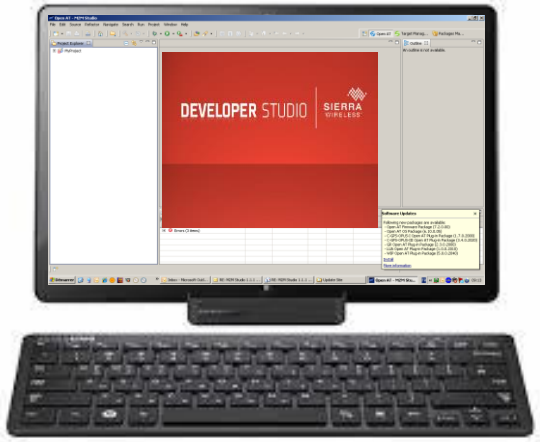
Developer Studio

Integrated Development Environment





- **Target Connection Management**
  - IP based connection through Ethernet, USB (Ethernet over USB) or UART (PPP)
  - Download the Linux Image and Root File System inside the target
  - Control target through shell
  - Read/Write embedded file system
- **Application Project Management**
  - Create/Edit/Delete Project
  - In-line Legato API documentation
  - Compile project with GCC toolchain
  - Manage app life cycle (Download/Install/Start)
  - Configure the target data base
  - Store and display logs from the target
  - Debug the application through GDB
  - OS awareness: memory map and consumption, process/thread activities
- **Compatibility**
  - Linux and Windows compliant (inc. cross toolchain)
  - For sandboxed and non-sandboxed applications

How Do I Get Started?

Go to

legato.io

SIERRA WIRELESS | Source

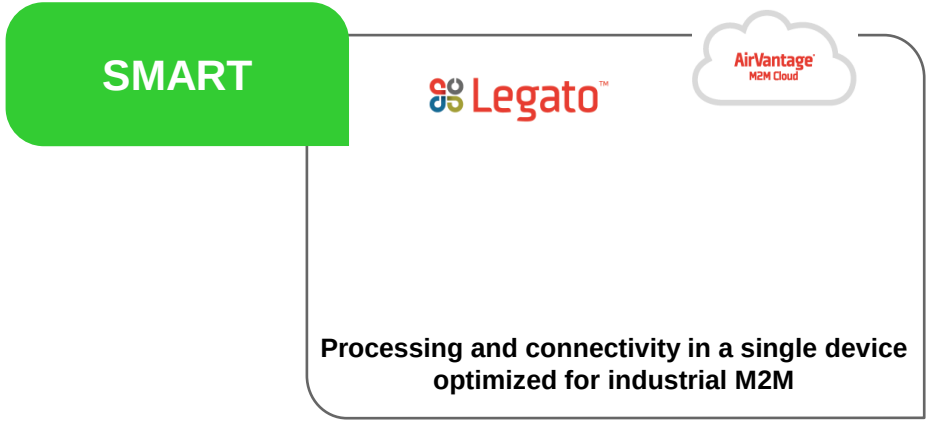
SIERRA WIRELESS | Sierra Wireless Developer Forum
Please register at www.sierrawireless.com/register to use this forum

New WP series, 3G/4G modules w application processing

Key Benefits:

- Simplified system design with dedicated application processing from a powerful multicore architecture
- Application development with Linux, Legato™ open source embedded platform
- Device management and machine data capture through pre-integrated cloud services

Model	Air Interface
WP85xx	3G - HSPA+ with optional GNSS
WP75xx	4G - LTE with optional GNSS



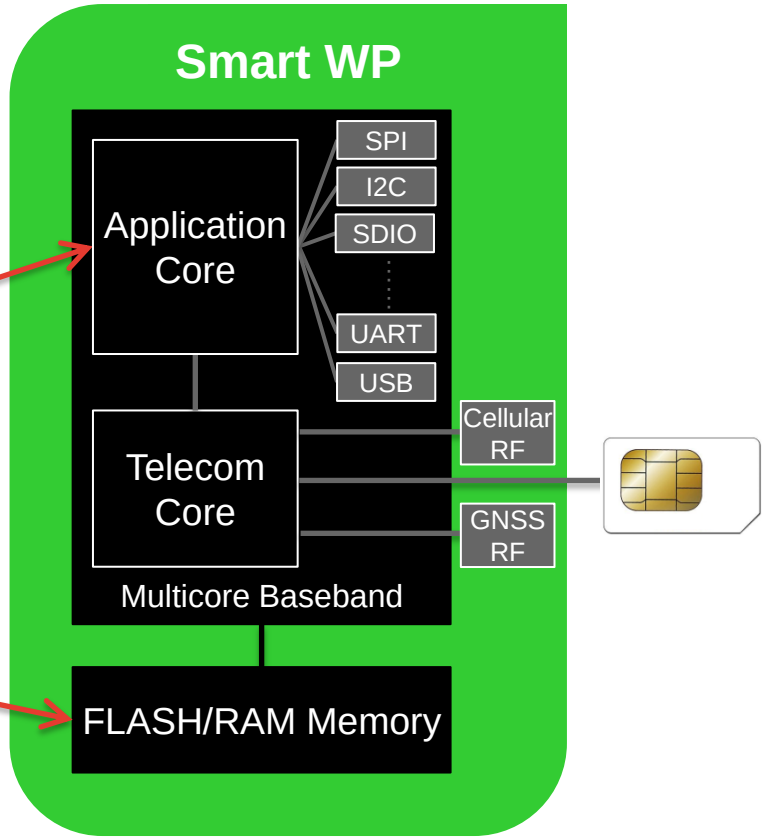
Processing: Multicore processor
Embedded environment : Legato Platform (Linux)
Device-to-cloud: AirVantage M2M Cloud
Air Interfaces: 3G (HSPA+) / 4G (LTE)
Package: LGA solder down 244 pads
Snap-in socket option to change modules at any time
Interfaces: USB, UARTs, Audio, SDIO, ADC, SPI, I2C, …

AirPrime® WP Hardware Architecture

Legato Platform is running on a powerful dedicated core

3G / 4G
CORTEX-A5 @ 550 MHz 32 KBytes I-cache 32 KBytes D-cache 256 KBytes cache L2 ARMv7 instructions Up to 863.5 MIPS
256 MBytes FLASH* 128 MBytes RAM*

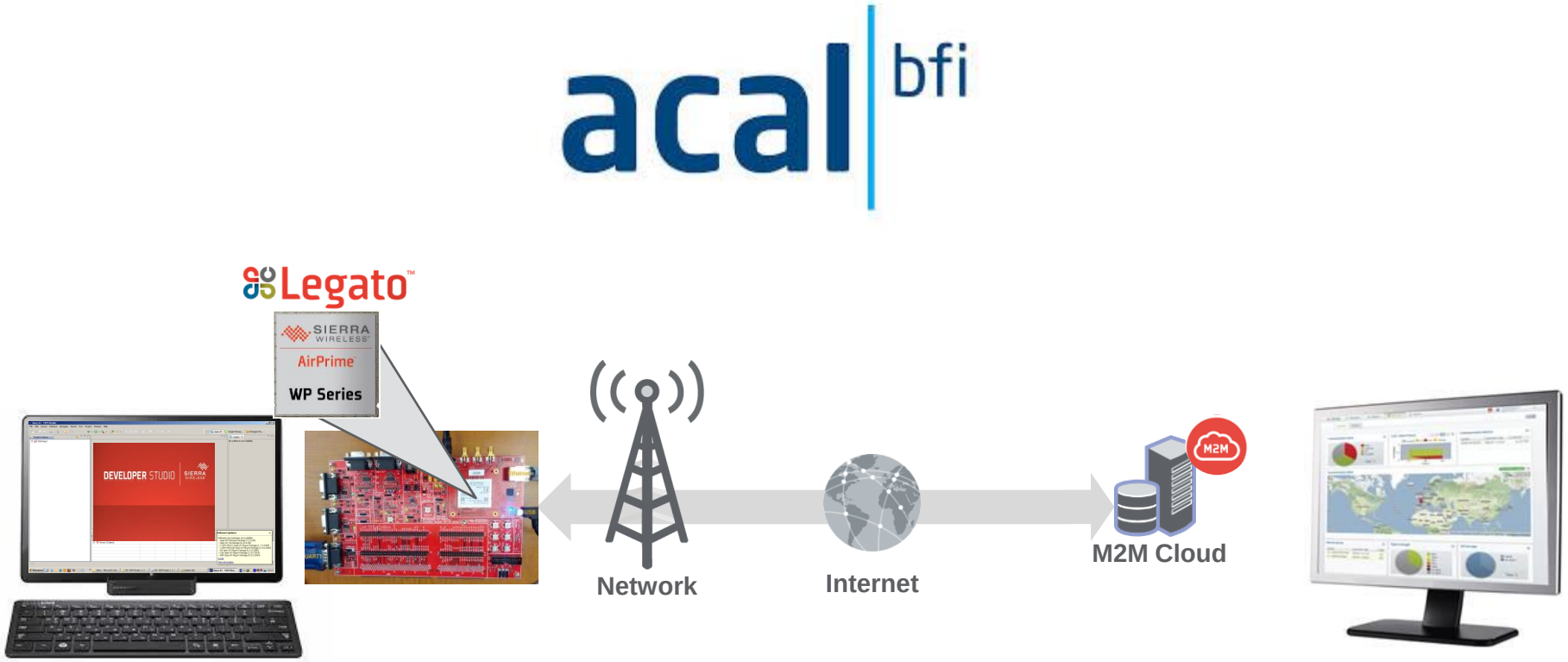
(*) Reserved for all embedded software running on the application processor including Linux kernel, root file system, framework and applications. Code is executed in RAM



NEW : AirPrime MC/EM74xx - High Speed LTE-A

- Cat 6 LTE-A (CA), 300 Mbps
- 4G: LTE FDD & TDD ; 3G: DC-HSPA+
  - MC7455: Europe, N & S America, APAC
  - MC7430: Japan, APAC
- Mini Card F1 or M.2 (NGFF) form factor & Pin-out
- Linux, Windows, Android
- M2M Cloud support
- Multiple firmware image support
- Dual SIM interfaces

Demonstration



Thank You!

Welcome to our stand