

# Digi Embedded Updates

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Digi China

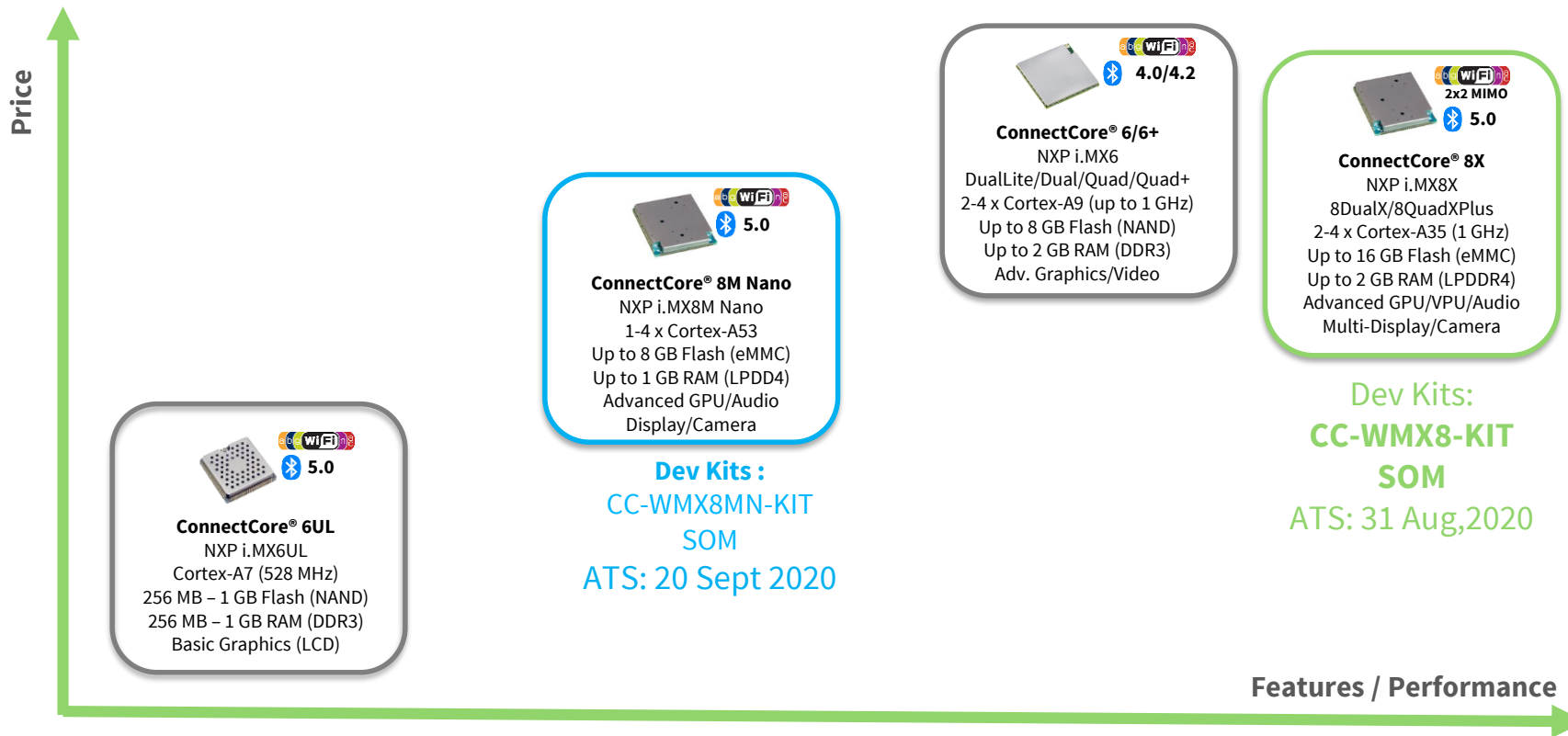
May 2020 Webinar



# Agenda

- ConnectCore portfolio overview
- ConnectCore Comparision
- ConnectCore 8M Nano in details
- Digi SOM MCA & Digi APiX
- ConnectCore Software
- Digi SOM Competitiveness

# ConnectCore portfolio



## ConnectCore® 6UL

NXP i.MX6UL  
Cortex-A7 (528 MHz)  
256 MB – 1 GB Flash (NAND)  
256 MB – 1 GB RAM (DDR3)  
Basic Graphics (LCD)



## ConnectCore® 8M Nano

NXP i.MX8M Nano  
1-4 x Cortex-A53  
Up to 8 GB Flash (eMMC)  
Up to 1 GB RAM (LPDDR4)  
Advanced GPU/Audio  
Display/Camera

### Dev Kits :

CC-WMX8MN-KIT  
SOM

ATS: 20 Sept 2020



## ConnectCore® 6/6+

NXP i.MX6  
DualLite/Dual/Quad/Quad+  
2-4 x Cortex-A9 (up to 1 GHz)  
Up to 8 GB Flash (NAND)  
Up to 2 GB RAM (DDR3)  
Adv. Graphics/Video



## ConnectCore® 8X

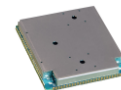
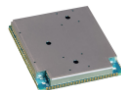
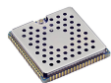
NXP i.MX8X  
8DualX/8QuadXPlus  
2-4 x Cortex-A35 (1 GHz)  
Up to 16 GB Flash (eMMC)  
Up to 2 GB RAM (LPDDR4)  
Advanced GPU/VPU/Audio  
Multi-Display/Camera


### Dev Kits:

CC-WMX8-KIT  
SOM

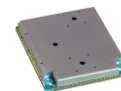
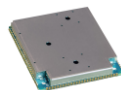
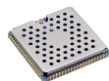
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# ConnectCore products comparison



	ConnectCore® 6UL	ConnectCore® 8M Nano	ConnectCore® 8X
Processing	Single-Core	Multi-Core	Multi-Core
HMI / Media	Basic (Graphics)	Advanced (Graphics + Audio)	Advanced (Video + Audio)
# Displays	1 x WXGA	1 x 1080p	2 x 1080p + 1 x WXGA
Connectivity	Basic 2 x 10/100 Ethernet 802.11 ac 1x1 Bluetooth 5.0 CAN 2.0b	Advanced 1 x Gigabit Ethernet 802.11 ac 1x1 Bluetooth 5.0 CAN-FD (Ref Design)	Advanced 2 x Gigabit Ethernet 802.11 ac 2x2 Bluetooth 5.0 CAN-FD
Machine Learning	No	Yes	Yes
OS	yocto PROJECT	yocto PROJECT	yocto PROJECT  android
Price	\$	\$\$	\$\$\$

# ConnectCore products comparison

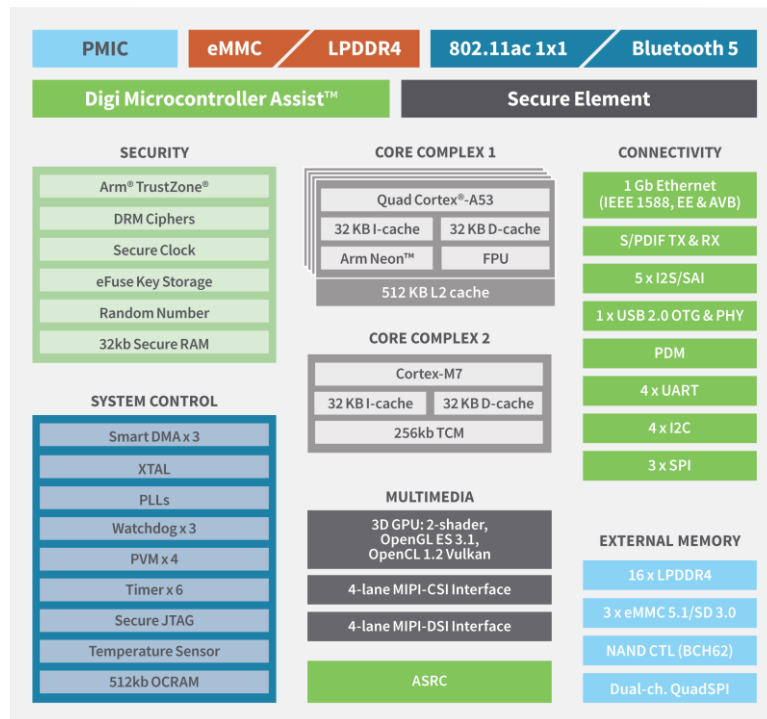


		ConnectCore® 6UL	ConnectCore® 8M Nano	ConnectCore® 8X
General	Form-Factor	SMTplus™ (29x29 mm)	SMTplus™ (40x45 mm)	SMTplus™ (40x45 mm)
	OS	Yocto Linux	Yocto Linux	Yocto Linux, Android
	Silicon Process	CMOS 40 nm	14 nm FinFET	28 nm FD-SOI
	Primary Core	1x Cortex-A7 (528 MHz)	1-4 x Cortex-A53 (1.4 GHz)	2-4 x Cortex-A35 (1.0 GHz)
	Secondary Core	-	1x Cortex M7 @ 600 MHz	1x Cortex M4F @ 266MHz *
	Flash	256 MB - 1 GB (NAND)	8 GB (eMMC)	8-16 GB (eMMC)
	RAM	256 MB - 1 GB (DDR3)	512 MB - 1 GB (LPDDR4, 16-bit)	512 MB - 2 GB (LPDDR4, 16-/32-bit)
Multimedia	GPU	-	GC7000UL (2-Shader), OpenGL/CL	GC7000Lite (2-/4-Shader), OpenGL/CL
	VPU	-	-	4K h.265 (decode), 1080p h.264 (enc/dec)
	Display	1x Parallel (WXGA)	1x MIPI DSI (1080p60)	2x MIPI DSI/LVDS (1080p60) + 1x (WXGA)
	Camera	1x Parallel CSI	1x MIPI CSI	1x MIPI CSI (4 lanes), 1x Parallel CSI
	Audio	-	5x SAI, PDM	4x SAI, Tensilica® HiFi 4 DSP *
Connectivity	Wireless	802.11 ac 1x1, BT 5.0 *	802.11ac 1x1, BT 5.0 *	802.11ac 2x2, BT 5.0 *
	Ethernet	2x 10/100	1x Gigabit	2x Gigabit
	USB	2x USB 2.0 OTG	1x USB 2.0 OTG	1x USB 3.0 OTG, 1x USB 2.0 OTG
	CAN	2x FlexCAN (2.0b)	Dev Kit Ref Design (FD)	3x FlexCAN (FD)
	PCIe	-	-	1x PCIe 3.0 (1 lane) *

\* Feature not supported on all variants

# ConnectCore 8M Nano 概览

- NXP i.MX 8M Nano (1-4 x Cortex-A53 @ 1.6 GHz)
- Up to 8 GB Flash (eMMC) / 1 GB RAM (LPDDR4)
- Other capacities possible based on business case
- Industrial temperature (-40 to +85C)
- Advanced multimedia (GPU / Display / Audio)
- Microcontroller Assist
- Low power modes, additional GPIO, UART, & security
- Digi SMTplus® form-factor
- Pre-certified 802.11 a/b/g/n/ac + Bluetooth 5.0
- Seamless cellular integration (Digi XBee®, 3rd party)
- Digi TrustFence® security framework
- Secure element
- Yocto Linux support



# i.MX8M Nano VS i.MX8X 处理器比较

## i.MX8M Nano 特点

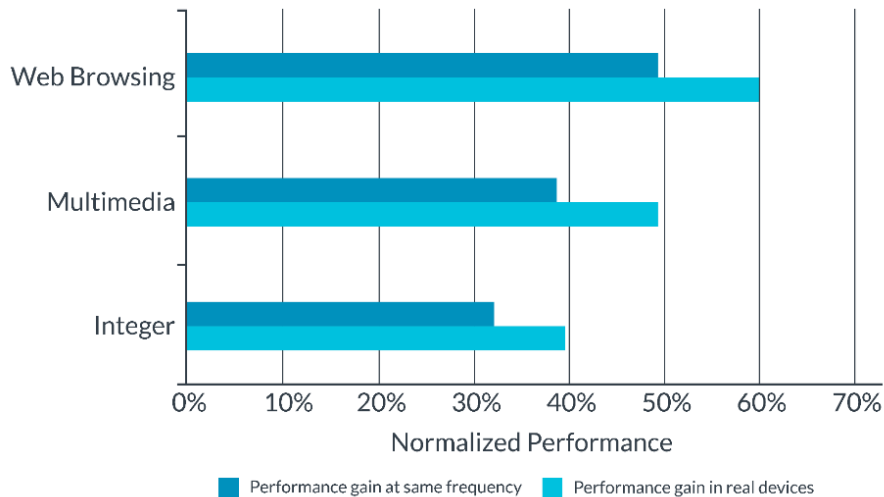
- 高主频CPU带来高性能处理器能力
  - up to 4 Cortex-A53 @ 1.4GHz
- 自带协处理器 Cortex-M7 @ 600MHz
- LPDDR4 – 低功耗，高性能和长期可用性
- 可选集成高性能的图形处理器
- 高性能的音频处理能力
- 更多型号可选

## i.MX8X额外性能

- 多路工业显示接口
  - MIPI DSI
  - Parallel LVDS
- 硬件视频处理单元4k编解码能力
- 双千兆以太网
- USB 3.0支持
- 更多工业外设接口:
  - CAN bus (集成CAN-FD)
  - ADCs
  - Keypad controller
  - More UARTs

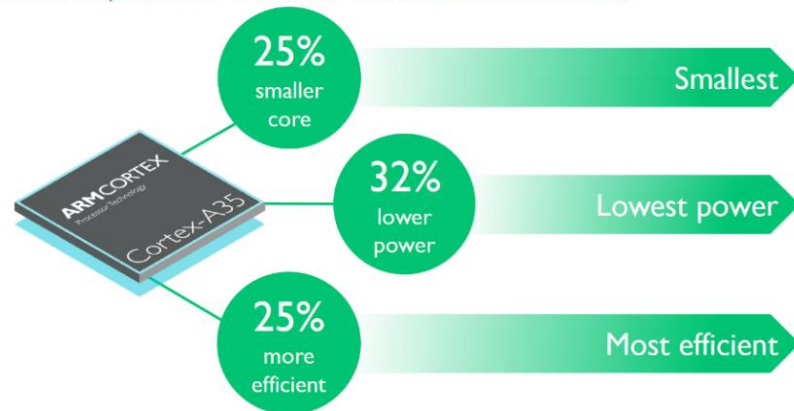
# ARM Architecture Comparison

## Cortex-A7 vs Cortex-A53



## Cortex-A53 vs Cortex-A35

Smaller, Lower Power Than Cortex-A53



9 ©ARM2015

Same frequency implementations on 28nm process technology with identical core configurations

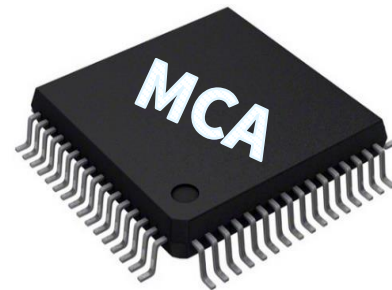
ARM

CC8X架构更先进，但CC8Mnano工艺更适合高主频SOM，两者在功耗性能比上相似  
物联网时代，A53和A35架构更适合带有边缘计算需求的产品  
Digi ConnectCore已配齐高，中，低端SOM家族



# Digi Micro Controller Assist™

模块上额外集成协处理器，不占用CPU自带的协处理器  
提供丰富的预置功能和API



		CC6UL MCA	8M Nano MCA	CC8X MCA
Available Features	RTC	√	√	√
	WatchDog	√	√	√
	Power Button	√	√	√
	PM & Reset	√	√	√
	Tamper Pins	√	√	√
	GPIO	8	15	19
	ADC	5	5	9
	PWM	0	1 controller/6ch	3 controller/10ch
	UART	1	Up to 3	Up to 3
	NVRAM	√	√	√
	Voltage Reference	1.2 V	1.2V	1.2V
On Demand	External Clock output	32.768KHz	32.768KHz	32.768KHz
	Keypad			
	LED Controller			

\* Feature not supported on all variants

# ConnectCore 8X – 8M Nano compatibility

## Compatible when using the primary pad function

- Some pads may require a voltage shifter (like i2c)
- An specific AppNote on this topic will be created
- Smart IOmux will help to create compatible designs
- New CAD library component

## Example – ConnectCore 8M Nano development board

- First prototypes validated with the ConnectCore 8X and a socket

## Standardization of SMTPlus form factors

- SMTPlus 40x45 – ConnectCore 8X & 8M Nano
- SMTPlus 29x29 – ConnectCore 6UL

相同封装，主要引脚功能相同，开发环境相同，中高端产品可统一PCB印制版，加快上市周期和减少开发投入



# Connectcore 8M Nano wireless



## Same wireless combo solution used on CC6UL and CC6+ (QC6564)

- Connected over SDIO for WIFI and UART for BT
- Independent power switch
- Single antenna for WIFI and BT

## 802.11 a/b/g/n/ac

- Same functionality available on CC6UL
- Station, WAP, WIFI-Direct, concurrent modes, fast-roaming

## Bluetooth

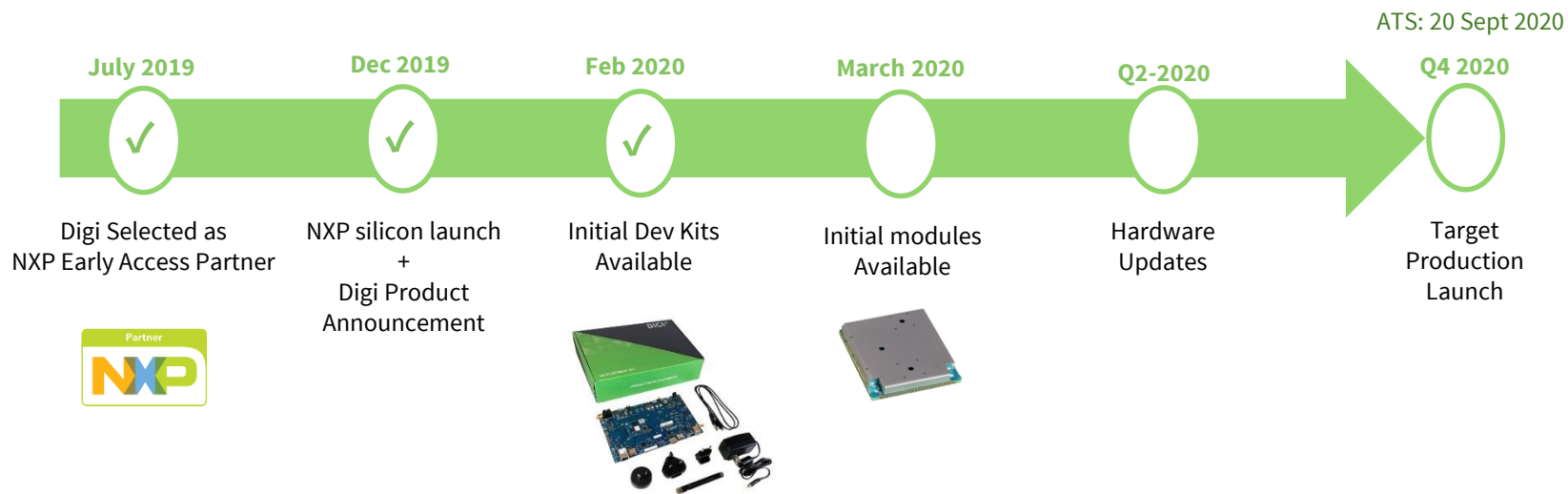
- BLE 5.0 compliant mac (no advanced optional 5.0/5.1 features)
- BT qualification pending
- Same functionality available on ConnectCore 6UL & 8X

CC8X: QC6574A + pcie

# ConnectCore 8M Nano variants

PART NUMBER	i.MX 8M NANO	GPU	WIRELESS	FLASH	RAM
CC-MX-FR6D-ZN	Solo Lite	-	-	8 GB	512 MB
CC-WMX-FR6D-NN	Solo Lite	-	Yes (1x1)	8 GB	512 MB
CC-MX-FS7D-ZN	Quad	Yes	-	8 GB	1 GB
CC-WMX-FS7D-NN	Quad	Yes	Yes (1x1)	8 GB	1 GB

# ConnectCore 8M Nano schedule



# TrustFence® security

**Not implemented on first version of BSP**

## Planned features

- Secure boot
- Secure ports (console/JTAG)
- Encrypted filesystem
- TRNG
- Tamper pins
- Cryptochip
- FIPS 140-2 crypto module



# Digi Embedded Yocto - 2.6-R3

## Based on Yocto 2.6 (Thud)

### Supported platforms

- **ConnectCore 8M Nano (new)**
- ConnectCore 8X
- ConnectCore 6 Plus
- ConnectCore 6UL
- ConnectCore 6

### Kernel versions

- Kernel v4.9.212: ConnectCore 6, 6Plus
- Kernel v4.14.170: ConnectCore 8X, ConnectCore 8M Nano, ConnectCore 6UL

### U-Boot versions

- U-Boot 2019.04-r1: ConnectCore 8X
- U-Boot 2018-03-r3: ConnectCore 8M Nano
- U-Boot 2017-03-r5: ConnectCore 6, 6Plus, ConnectCore 6UL

### Updated CC8X SCU firmware to v1.3.0

- Incompatibilities between different DEY/U-Boot versions
- The Release notes provide more details



# What is supported on the first release?

## Linux (kernel v4.14) supported interfaces

- Serial console
- On module eMMC
- Built-in WIFI
- Bluetooth (classic and LE)
- MCA
  - Watchdog
  - RTC
  - Power button
  - GPIOs
  - ADCs
  - PWMs
  - Tamper pins (digital and analog)
  - Up to 3 UARTs
- OTP bits (e-fuses)
- PMIC (note that second spin will use a different model)
- Ethernet 10/100/1000
- MicroSD card
- USB hub
- USB for recovery
- Processor UARTs
- On dev board RS485
- I2C ports
- SPI
- On dev board XBee Cellular
- On dev board XBee RF
- Mipi DSI with AUO 10.1” display
- Touch controller
- On board Mipi DSI-to-HDMI bridge
- On board Mipi DSI-to-LVDS bridge
- On board Audio codec
- User leds (GPIOs)
- User buttons (GPIOs)
- On board CAN controller (see KIL)
- Power Management (phase 1)
- JTAG and SWD debug ports
- Boot switches



# What is supported in the first release?



U-Boot

## U-Boot 2017.03-r3

- Basic support for DT
- Standard Digi dboot, update, commands
- Support for Ethernet
- Support for eMMC
- Support for SD
- Support for USB



## Yocto – common features on all platforms

- Eclipse plugin
- Embedded APIX
- Remote Manager
- NetworkManager, ModemManager
- XBee support
- AWS GreenGrass

# ConnectCore documentation

## Documentation Portal

- Digi Embedded Yocto documentation
- SoM Hardware Reference Manual
- Development board HRM
- Development board design files:
  - Schematics
  - Layout
  - Bill of Materials
- Smart Iomux

[www.digi.com/connectcore/start](http://www.digi.com/connectcore/start)

中国区: digiwiki.eccee.com 文档库  
gitlab.eccee.com:11080

安全免费企业项目开发托管平台



### Digi Embedded Yocto

Learn how to flash and launch Digi Embedded Yocto in your ConnectCore® 8M Nano device. Build and customize your own Yocto image to fit the needs of your project.



### Hardware

Access the hardware reference manual and schematics of the ConnectCore® 8M Nano and other related devices such as the ConnectCore® 8M Nano Development Kit.



### Resources

Find all the necessary Digi attachments to work with your ConnectCore® 8M Nano device. Learn how to perform other specific tasks and get answers to the most common issues.

# ConnectCore Software Schedule



## DEY-2.6-r3 based on Yocto 2.6 (Thud)

### Supported platforms

- ConnectCore 8M Nano (new)
- ConnectCore 8X
- ConnectCore 6 Plus
- ConnectCore 6UL
- ConnectCore 6

### TrustFence support for CC8X (phase 1)

- Secure boot

### XBee Cellular support for CAT-M and NBloT

- Through ModemManager
- Through USB interface
- Deprecated original support over serial port

### New WIFI/BT mac firmware and driver for CC6UL

- BLE 5.0 compliant
- Multiple bugfixes

### Enhanced Power Management support for CC8X

### FIPS 140-2 for CC6UL

- Was broken in previous DEY-2.6 releases

### Multiple package updates, fixes and documentation enhancements

# Digi SOM Competitiveness

1. 封装：LGA+SMT，CPU所有引脚均可见，同类尺寸最小
2. SOM集成度：除最小系统所需外，还挂有独立的MCA（丰富的预置功能和API），以及Wifi和额外安全芯片
3. SOM元器件从严选型，处理器均汽车级，Flash和RAM均工业级
4. 提供开发套件和单板机，板上各接口均已验证，并提供原理图工程文件以供裁减定制
5. 提供LCD触屏套件参考，支持各种自定义屏
6. SOM出厂即带有uboot，除嵌入式Linux外，一些平台同时支持Android
7. 除MCA的API外，BSP还为各种外设接口提供Digi API库，以方便应用程序调用。
8. 提供开发套件或单板机的Linux固件，系统开发和软件环境各平台相同，提供现成的IDE和QT支持
9. 丰富的接口例程
10. 超强边缘计算能力，各种云连接支持，包括DRM，AWS Greengrass等
11. Trustfence为IoT安全加固
12. 10~15年以上长生命周期供货产品

# Questions?

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<https://digiwiki.eccee.com>