

# M2.COM Open Standard for IoT Applications

**Bernd Hacker Advantech Europe B.V.**  
**November 2<sup>nd</sup>, 2016**

# Advantech

at a Glance

Advantech defines its brand mission as “Enabling an Intelligent Planet”, to empower innovative technologies and solutions.

- Headquarters  
**Taipei, Taiwan**
- Established  
**May, 1983**
- Employees  
**8,000**
- Revenue  
**USD \$1,201M**  
(2015)



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*Enabling an Intelligent Planet*





# Mega Trends of Industries

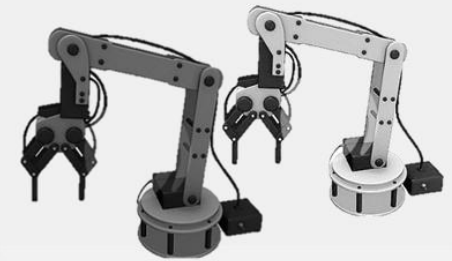
## Internet of Things



## Smart City



## Industry 4.0



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# The IoT Challenge

Data from sensors, is getting more and more important and of interest.

This is challenging manufactures of sensors and System Integrators (SI), to provide for a wide field of applications and markets newest sensor technologies and fast innovation cycles.

Wireless technologies play a key role to connect Sensors to the Internet, but at the same time challenging from an integration and certification point of view.

# Challenges of deployment









Local regulations and certifications

Reuse or replacement of existing infrastructure and solutions

Low power solution/design for battery operation

Time to market and ROI

Various wireless technologies / protocols - each with their own value proposition

Low Power Wide Area Networks (LPWAN)					Short Range Networks			
Technical	 LoRa WAN	 nwave	 SIGFOX		 Bluetooth SMART	 Wi-Fi	 Thread	 ZigBee
Range	2-5 urban; 15 suburban; 45 rural	up to 10 km	up to 10 km urban; 50 km rural	35 km GSM; 200 km 3G/4G	80m	50m	Mesh	100m / Mesch
Frq. Band	varies; Sub-GHz	Sub-GHz	Freq. independent; 868/902 MHz	900/1800/1900/2100 MHz	2.4GHz	2.4GHz	2.4GHz	915MHz/2.4GHz
Deep Indoor Performance	Yes	Yes	Yes	No	No	No	No	—
Data Rate	0.3-50 kbps adaptive	10-100 kbps	10-1000 bps	75-170 kbps GSM/3-10 mbps LTE	< 1 mbps	600 mbps max.	—	250 kbps
Power Profile	Low	Low	Low	Medium	High	High	Low	Low

# M2.COM Standardization

<http://www.m2com-standard.org>

## Integration of

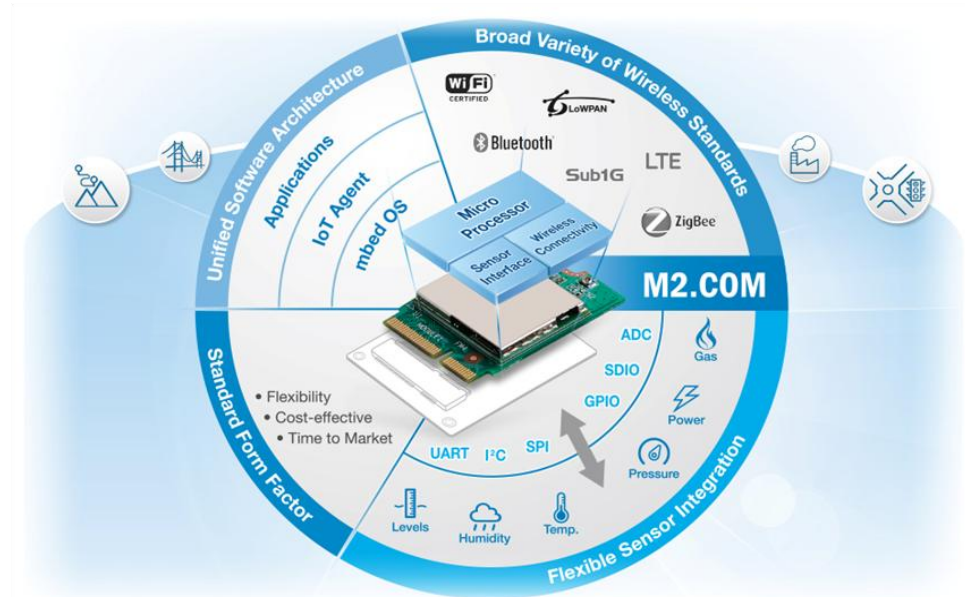
- Computing
- Wireless Connectivity
- Sensor

## Benefit

Proven Hardware - certification ready / certified Module

Unified Connectivity Module for Sensor Makers

Improved Time to Market



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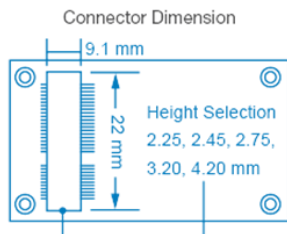
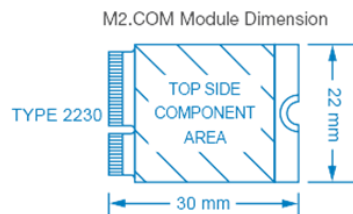
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# M2.COM Standardization

- Leverage PCI M.2 format & connector
- Dedicated Pin Definitions for M2.COM



Signal	Purpose
USB	A common interface for extending storage.
PWM	Motor control and power supply control.
SDIO	A common interface for extending storage through SD/MMC.
I <sup>2</sup> C	The most popular interface for sensors e.g., pressure, temperature, moisture, and lighting sensors.
I <sup>2</sup> S	Supports audio codecs for broadcasting and playing audio through external
UART	A commonly used protocol for device control, such as motors and electrical
GPIO	Basic I/O control, such as indicator lights, alarms, and buzzers.
SPI	LCM support to display values collected from the sensor or transmitted by an external device.
ADC	Using common GPIO pins, the ADC transforms the analog signal from the sensor into a digital signal, making the data readable and meaningful to the

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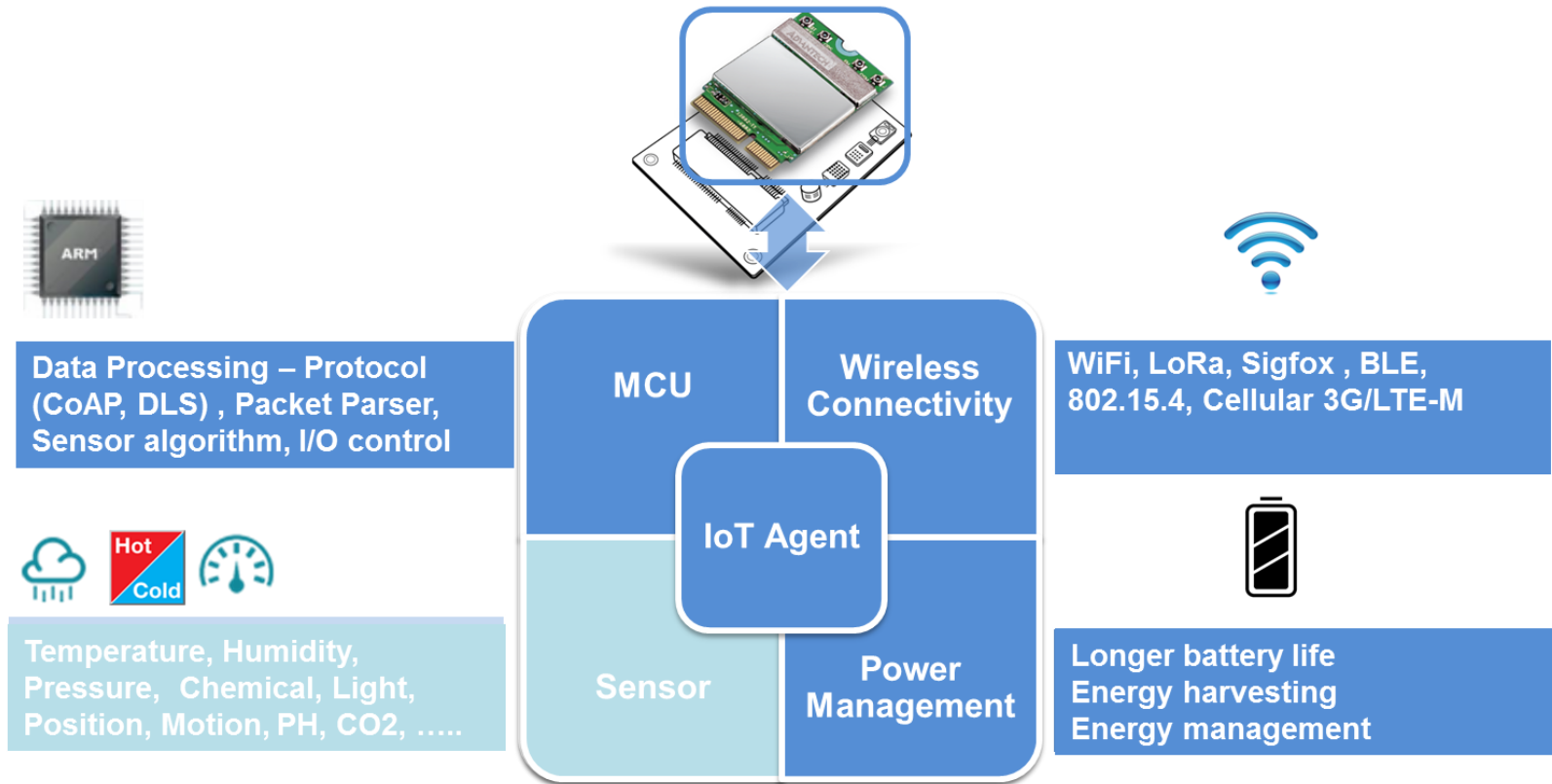
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# IoT Sensor Node Building Block



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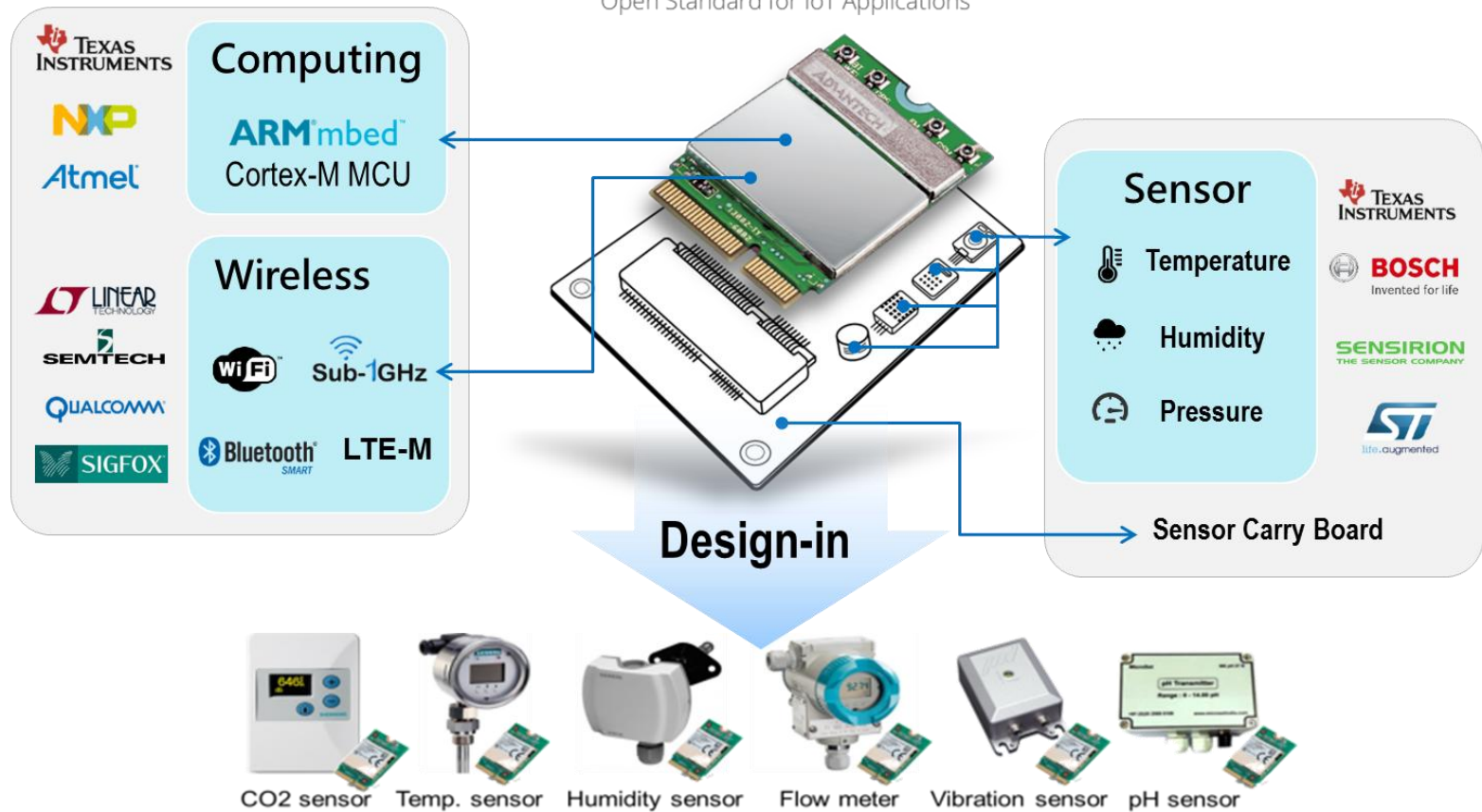
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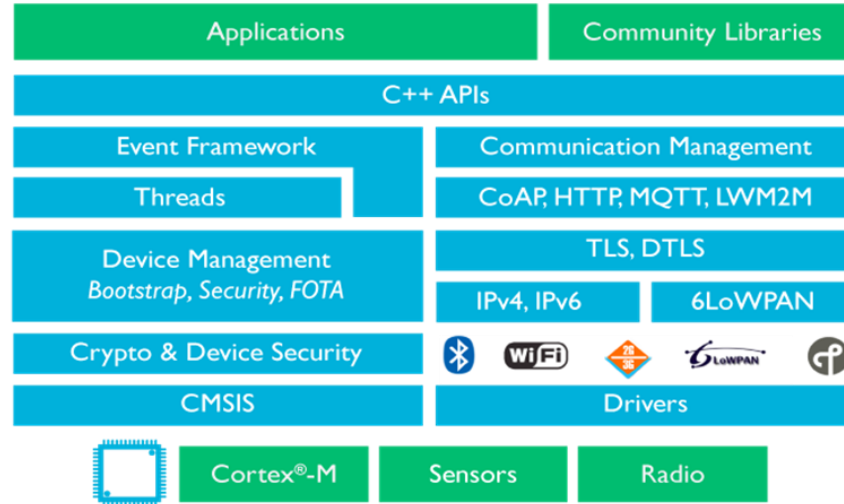
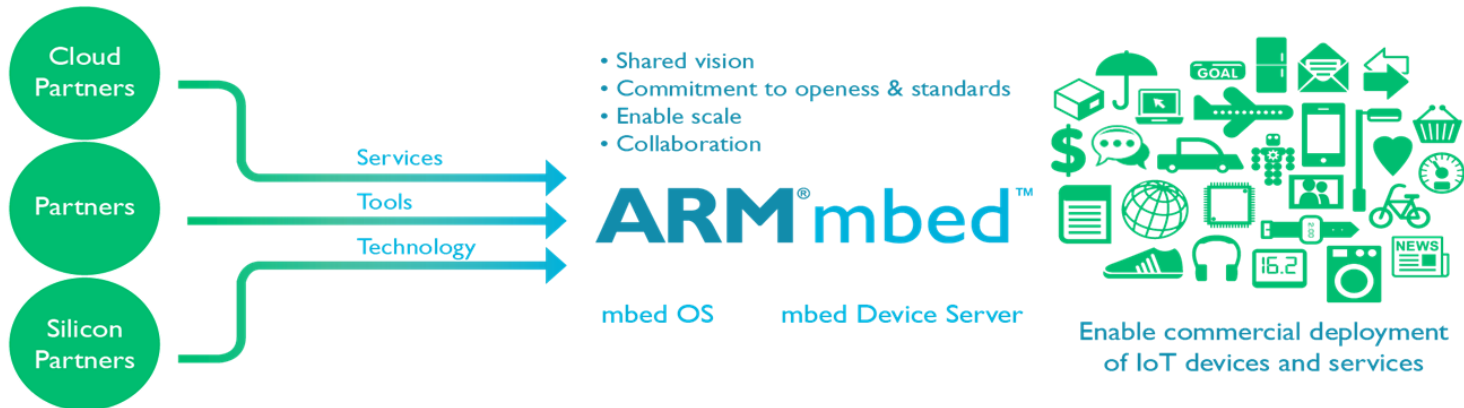


# Open Wireless Sensor Node Platform

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# Unified Software for IoT Sensor Platform



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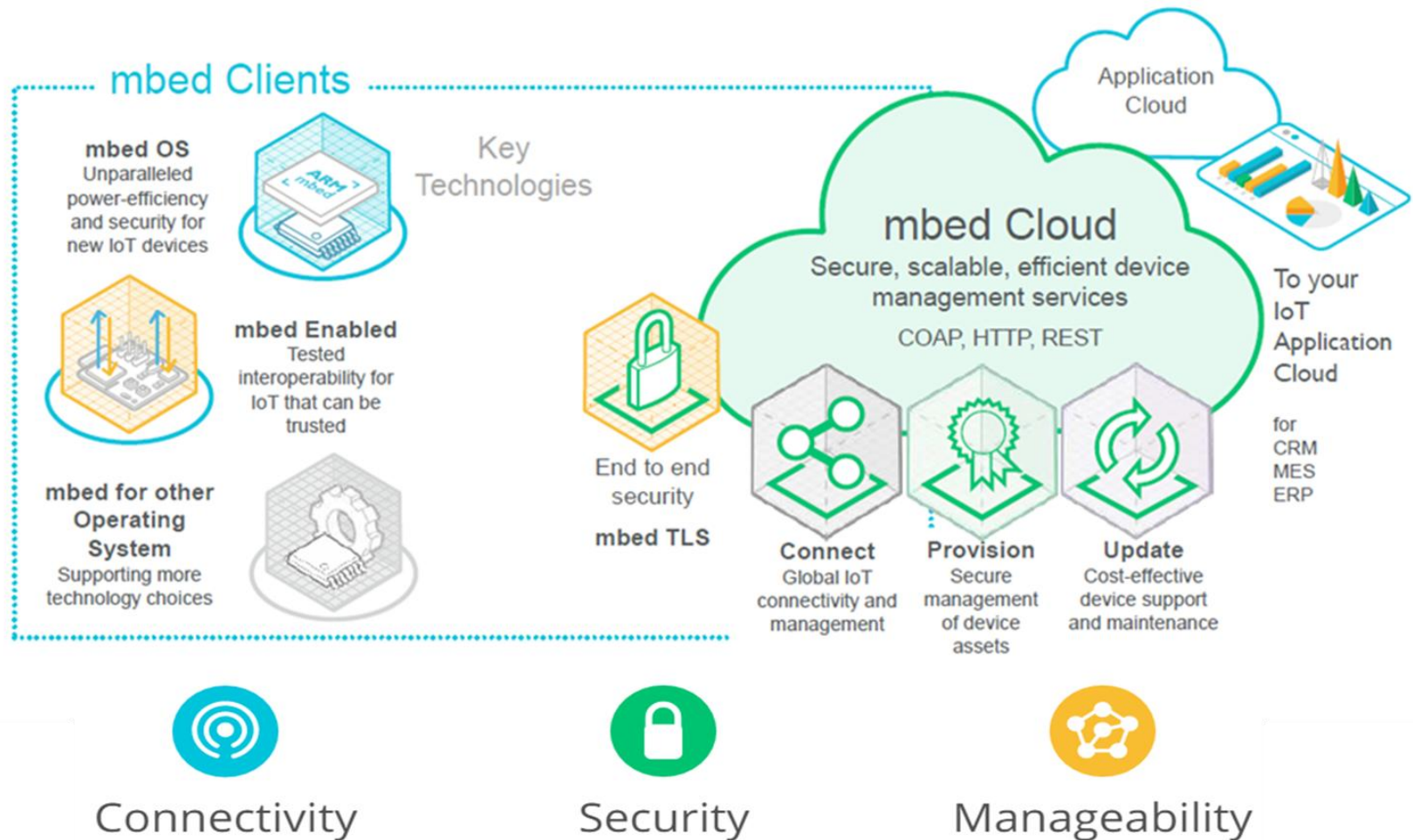
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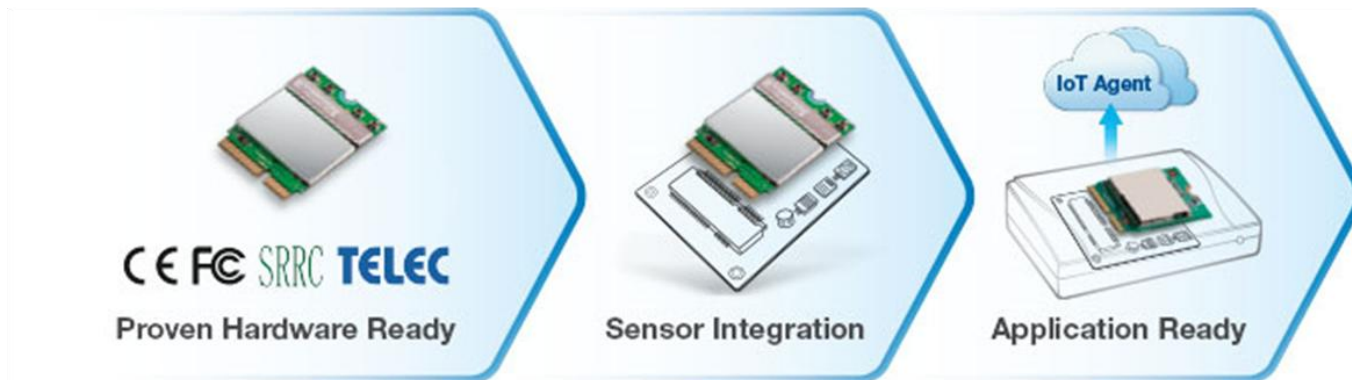
# M2.COM with mbed OS & mbed Cloud





# M2.COM Business Model

## Streamlined IoT Sensor Platform Development



# WISE-1520 / CC 3200MDO

## ■ Applications Microcontroller (extract)

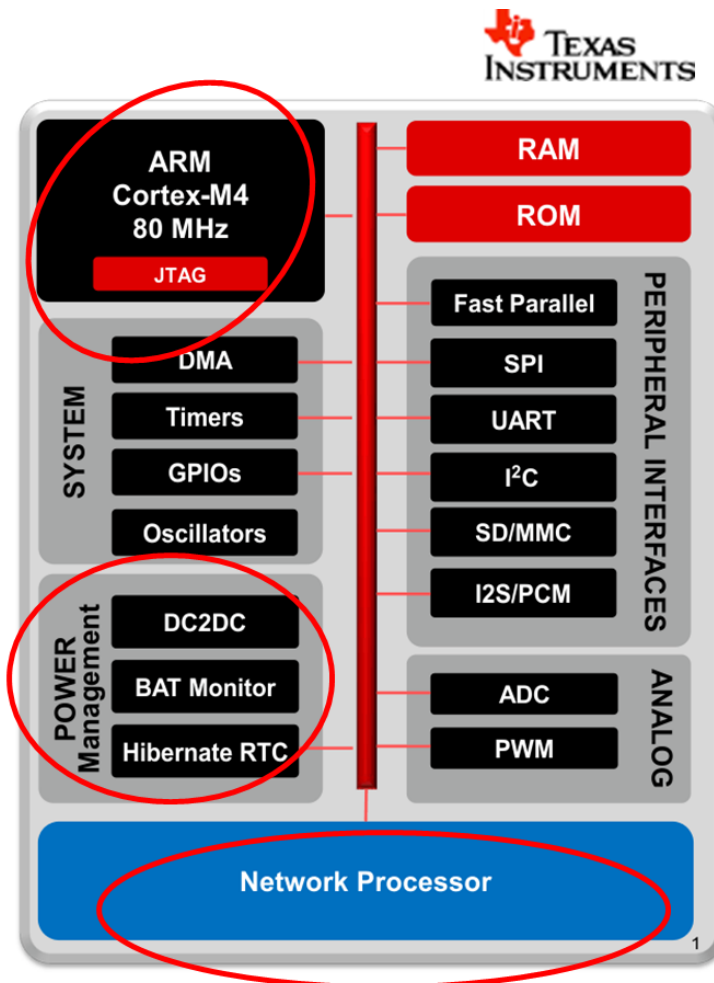
- ARM® Cortex®-M4 Core at 80 MHz
- RAM 256 KB; SPI Flash 1 MB
- Hardware Crypto Engine for Advanced Fast Security, including AES, DES, and 3DES, SHA2 and MD5, CRC and checksum

## ■ Wi-Fi Network Processor Subsystem (extract)

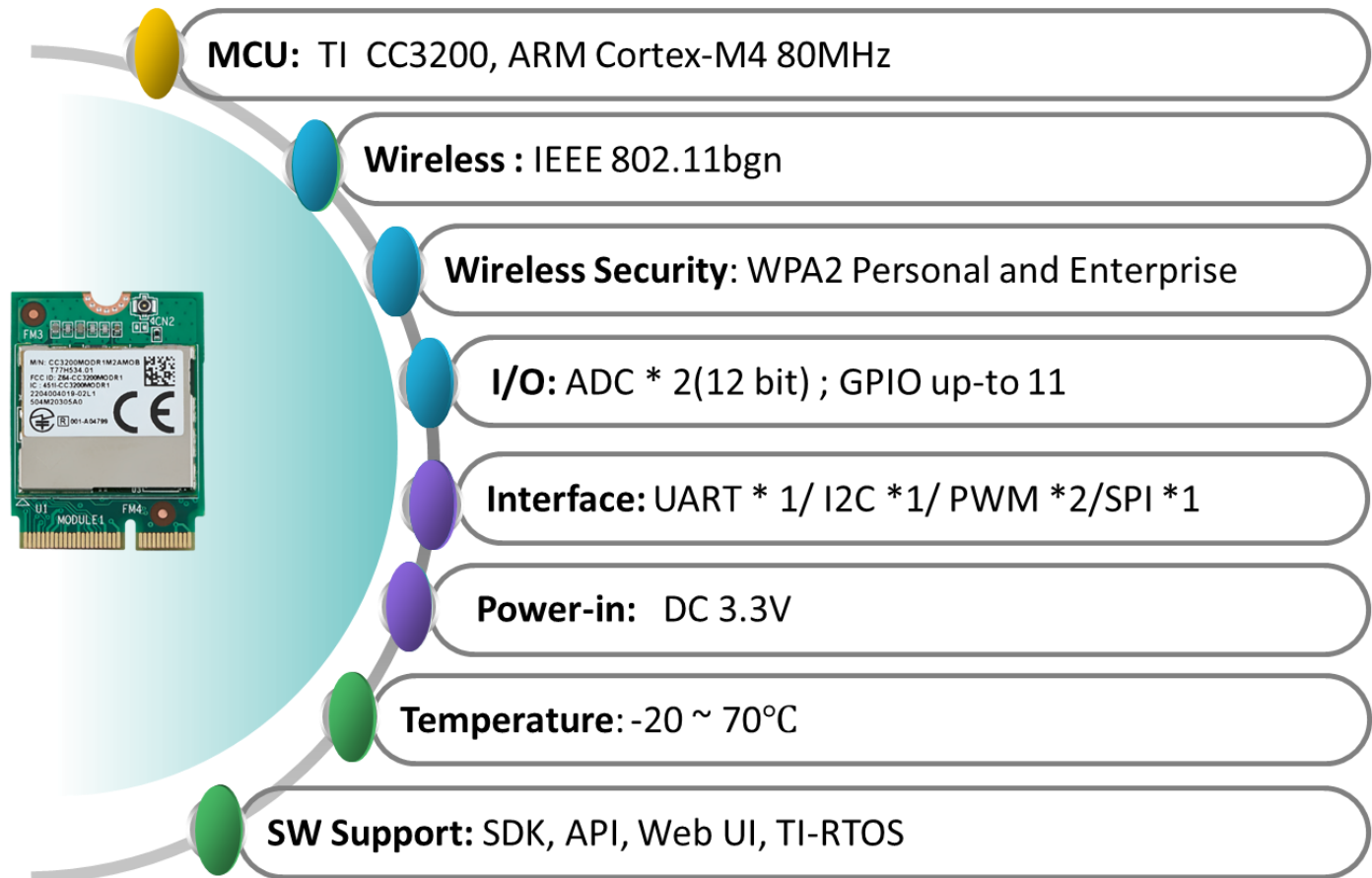
- 802.11b/g/n Radio, Baseband, and Medium Access Control
- TCP/IP Stack
- Powerful Crypto Engine for Fast, Secure Wi-Fi and Internet Connections with 256-Bit AES Encryption for TLS and SSL Connections
- Station, AP, and Wi-Fi Direct™ Modes
- WPA2 Personal and Enterprise Security

## ■ Power-Management Subsystems (extract)

- Advanced Low-Power Modes
  - Hibernate: 4 µA
  - Low-Power Deep Sleep < 275 µA
  - RX Traffic (MCU Active): 59 mA @ 54 OFDM
  - TX Traffic (MCU Active): 229 mA @ 54 OFDM, Maximum Power
  - Idle Connected (MCU in LPDS): 825 µA @ DTIM = 1



# M2.COM WISE-1520 WIFI IoT Node





# WISE IoT Agent "Lite"

- **"Lite" version**

- Reduced code size for ARM MCU's
- Only key functions implemented

- **WISE-Agent basic function**

- Read sensor data
- Processing data with RMM readable format

- **Benefits**

- Adopted to MCU ROM/RAM size
- Cloud ready sample code
- SKD/Sample code for customized development



```
//initial
WiseAgent_Init(ip, mac);
if(WiseAgent_Open(SERVER_ADDRESS) == 0) {
    //Error and return
    return;
} else {
    //Register a SenHub "OnBoard"
    WiseAgent_RegisterSensor(SN_MACADDRESS, "OnBoard", infospec, 2);
}

for(;;) {
    //Get Sensor Data from internal interface.
    GetSensorData(&Temperature, &Humidity);

    //Update data
    data[0].value = Temperature;
    data[1].value = Humidity;
    WiseAgent_Write(SN_MACADDRESS, data, 2);

    //delay 3s
    usleep(3000);
}
```

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# Summary

- **m2.com** – Open Standard for IoT applications  
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- **Certified Wireless Module**
- **ARM mbed Software**
- **Improved time to market**

# Thank You



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