

Internet of Things, MCUs, Sub-GHz RF, IPv6, 6LoWPAN, CoAP

## Tower System-Based Metropolitan Area Network Development Kit

### Overview

The TWR-METRO-KIT metropolitan area network (MAN) development kit enables you to quickly build a 6LoWPAN-compliant smart object network out of the box and integrate it with your own hardware for network performance evaluation in a real environment for Internet of Things or machine-to-machine application solutions. MANs are ideal for demanding applications such as “last mile” smart metering communication and street lighting control. A MAN is typically defined by extreme reliability over several miles while serving thousands of nodes per edge router or data concentrator with each node capable of meshing at dozens of hop levels deep.

The kit contains two wireless IP addressable end nodes that are line or battery powered, as well as a wireless edge router which connects to a PC or notebook, forming a solid basis to begin network evaluation and development. The kit can be easily expanded to support up to 20 end nodes. Each end node is built with a Nivis Smart Object radio module containing a Freescale Kinetis K series MCU based on the ARM® Cortex™-M4 core and an MC12311 sub-GHz smart radio transceiver with up to +15 dBm of native

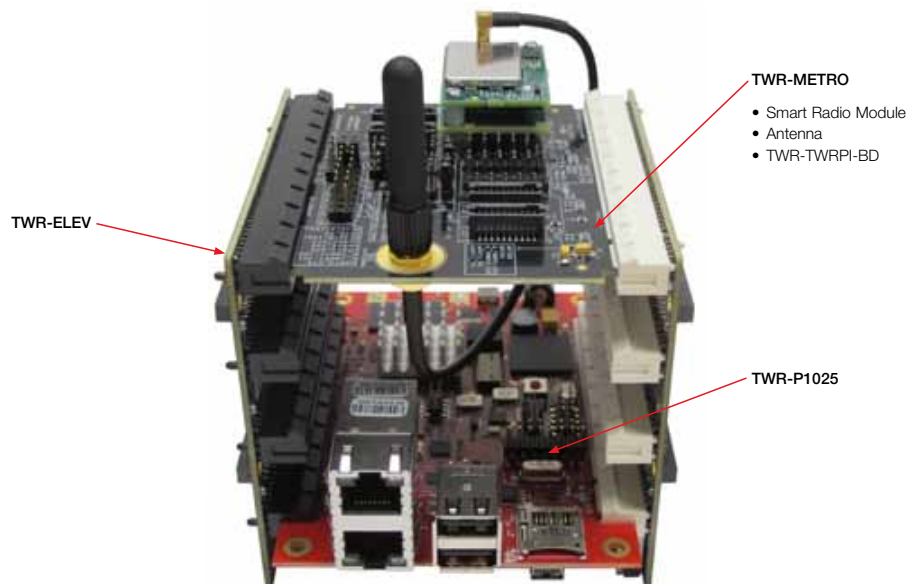
transmit power for miles of range without the need for RF power amplification. At the core of the edge router is a QorIQ P1025 power-based MPU running Nivis edge router software.

The MAN development kit is based entirely on IEEE and open Internet communication standards. The application, transport and networking layers of the smart object stack

are based on the latest Internet Engineering Task Force (IETF) standards which include CoAP, UDP, IPv6/6LoWPAN, RPL and ICMP. The application layer payloads adhere to EXI/XML encoding. The radio uses the new IEEE® 802.15.4e time synchronized channel hopping (TSCH) MAC and IEEE 802.15.4g PHY specifications.

### MAN Development Kit Features

#### Metropolitan Area Network Kit Edge Router



- Nivis smart object radio module
  - Certified for multiple world areas (902–928 MHz U.S./Canada, 921.4–928 MHz Japan, 863–870 MHz, Europe coming soon)
  - Communication stack from Nivis based on IEEE and open communications standards (CoAP, UDP, IPv6/6LoWPAN, RPL, ICMP, 802.15.4e TSCH MAC, and 802.15.4g PHY)
  - Kinetis K series MCU with crypto acceleration unit for AES128 link layer security
  - MC12311 sub-GHz radio, GFSK -120 dBm @1.2 Kb/s, +15 dBm power output without amp
  - Simple API interface to external MCU-powered devices allows quick wireless enablement
  - External flash for over-the-air updates
  - Sold separately by Nivis in volume for field trials and pilots

- METRO-NODE-NA/JA
  - Nivis smart object radio module with +0 dBm quarter-wave omnidirectional antenna
  - Battery or USB powered
  - Potentiometer analog value, discrete switch and battery power for easy demonstration
  - External SPI/UART header for easy integration of external PCBs to the Nivis smart object radio module
- May be purchased separately to expand the network by up to 20 nodes

- TWR-METRO-NA/JA
  - TWR-TWRPI-BD carrier board
  - Nivis smart object radio module with +0 dBm quarter-wave omnidirectional antenna
  - Allows connection of Nivis smart radio module to any Tower System-based MCU/MPU via SPI or UART to create your own end node and use other Tower System boards in the ecosystem, such as sensors
- May be purchased separately to develop your own end node using other Tower System boards
- TWR-P1025
  - Dual-core QorIQ P1025 processor
  - 512 MB of DDR3 memory
  - Two RGMII Gigabit Ethernet interfaces
  - One PCIe interface x1 (mini-PCIe+USB)
  - Nivis edge router software to manage the mesh network

## Software Enablement

- Nivis edge router software
- Nivis GUI that runs on the PC

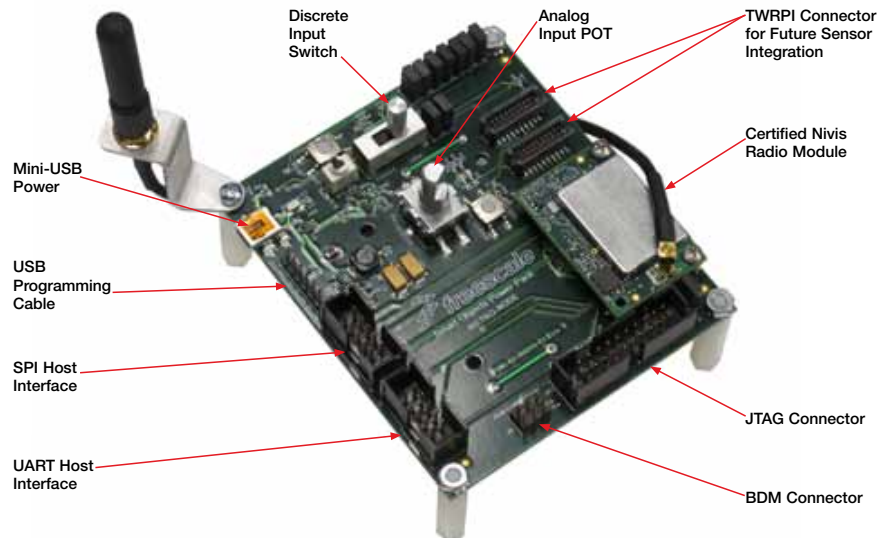
## Development Tools

Kit Number	Description
TWR-METRO-KIT-NA/JA	Development kit
Nivis smart object radio module	Sold separately by Nivis
TWR-METRO-NA/JA	Develop your own end node using Tower System boards
METRO-NODE-NA/JA	Tower System node
TWR-P1025	QorIQ P1025 processor kit

## Documentation

Freescale Document Title	Description
User guide	User guide for the development kit
API documentation	Specification for the module API
Radio module data sheet	Data sheet for the radio module
Metropolitan area network development kit quick start guide	Helps users with kit setup

## Metropolitan Area Network Kit End Node



For more information, visit [freescale.com/TWR-METRO-KIT](http://freescale.com/TWR-METRO-KIT)

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Document Number: TWRMETROA4FS REV 0

