

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.

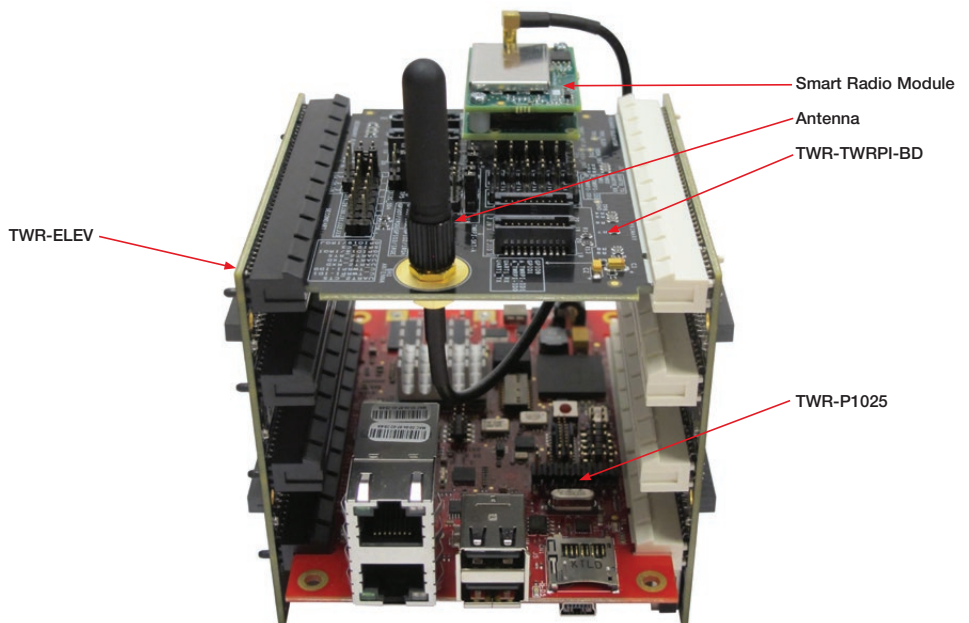
The kit contains two wireless IP addressable end nodes that are line or battery powered, as well as a wireless edge router which connects to a PC or notebook, forming a solid basis to begin network evaluation and development. The kit can be easily expanded to support up to 10 end nodes. Each end node 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.

## Metropolitan Area Network Kit Edge Router



## MAN Development Kit Features

- 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 at 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 omni-directional 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 10 nodes
- TWR-P1025
  - Dual-core QorIQ P1025 processor
  - 512 MB of DDR3 memory
  - Two RGMII Gigabit Ethernet interfaces
  - One PCI Express® (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

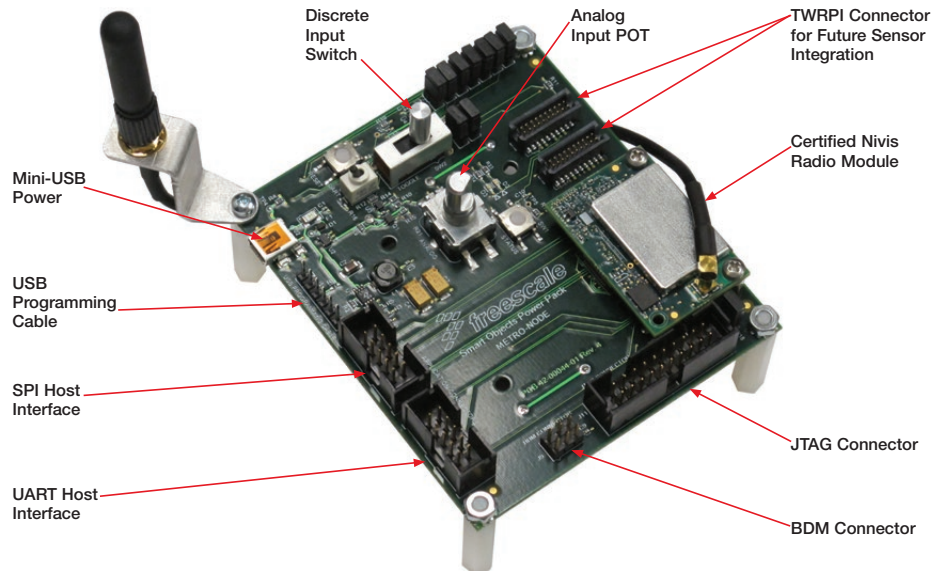
## Development Tools

| Kit Number                      | Description               |
|---------------------------------|---------------------------|
| TWR-METRO-KIT-NA/JA             | Development kit           |
| Nivis smart object radio module | Sold separately by Nivis  |
| METRO-NODE-NA/JA                | Tower System node         |
| TWR-P1025                       | QorIQ P1025 processor kit |

## Documentation

| Freescal 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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