

V2X 802.11p Message Evaluation Software MX727000A

V2X Message Analysis MX727020A/30A/40A



3 in 1 for V2X

One platform for evaluating key vehicle to everything (V2X) message technology for assured safety and security.

This software supports V2X message definitions used in the three key markets with functions required for V2X middleware development and evaluation.



V2X 802.11p
Message Evaluation Software
MX727000A





V2X Evaluations for United States, Europe and Japan

Using the MX727000A software in combination with the Signal Analyzer MS269xA/MS2830A supports vehicle-to-vehicle and vehicle-to-roadside communications soon to be deployed in United States, Europe and Japan. Eliminating the need for different instruments to support each regional standard cuts measurement infrastructure capital costs.

More Efficient Message Stack Development

Developers can easily isolate errors when receiving undefined messages by using the MX727000A software Error Display function, cutting the time to locate Message Stack errors and helping improve development efficiency.

Message Evaluation Standards and Guidelines

United States

IEEE802.11-2012, IEEE802.2-1998, IEEE1609.2-2016 (partly), IEEE1609.3-2016, IEEE1609.12-2016, SAR J2735 MAR 2016

Europe

IEEE802.11-2012, IEEE802.2-1998, IEEE802-2014, ETSI EN302 636-4-1 v1.2.1, ETSI EN 302 636-5-1 v1.2.1, ETSI EN 302 637-2 v1.2.1, ETSI EN 302 637-3 v1.2.1, ETSI TS 103 097 v1.2.1

Japan

IEEE Std 802.11-2012, ARIB STD-109 Ver.1.2, ITS Forum RC-010 Ver.1.0, ITS Forum RC-013 Ver.1.0



Anritsu is a member of the ITS Connect Promotion Consortium.

V2X 802.11p Message Evaluation Software MX727000A

Supports Required Message Evaluations and Measurements for V2V and V2I Communications

The V2X 802.11p Measurement and Analysis Software MX727000A is designed to be used in conjunction with the Signal Analyzer MS269xA/MS2830A to demodulate, analyze, and display V2X messages.

The MX727000A has the application options shown in Figure 1.

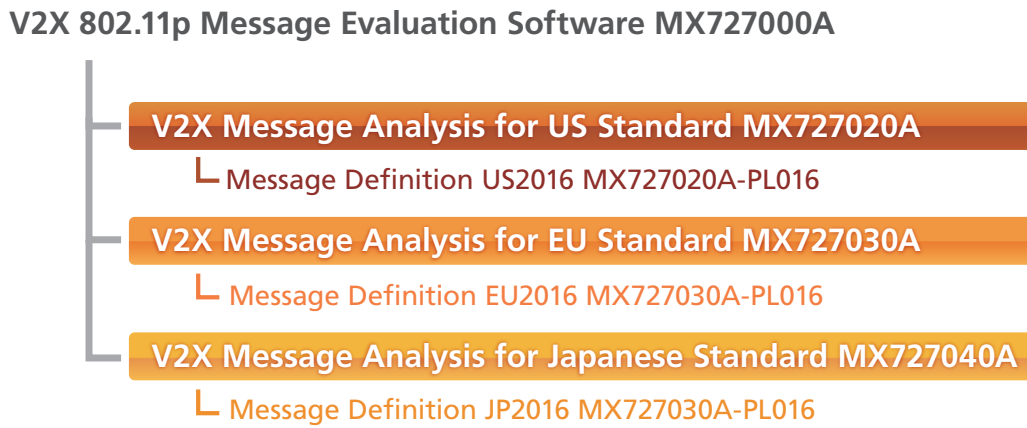


Figure 1: V2X 802.11p Message Evaluation Software MX727000A Configuration

V2X Message Analysis MX727020A/30A/40A

The V2X Message Analysis is the MX727000A application to capture the signal with V2X Message using the Signal Analyzer MS269xA/MS2830A, and to decode, display V2X Message. It supports V2X message standards for the three main markets of United States, Europe, and Japan, and shows its power at middleware development.

Middleware Evaluation Tools

Conventionally, developers face big challenges in correctly evaluating key data (messages) sent by wireless equipment at V2X middleware development. Previously, developers ran two-way tests between test prototypes after collating bit strings and ASCII code, which caused heavy work burdens. However, debugging two-way communications at tests between prototypes is not simple and particularly so for different regional communications standards. However, this way is not difficult to find the bug because developers cannot find such bug with two-way test and developer may interpret something wrongly. With its integrated development environment for comparing V2X messages developed in-house and by other companies, the V2X Message Analysis MX727020A/30A/40A software makes it easy to objectively evaluate messages using impartial measurements. Figure 2 shows a typical setup.

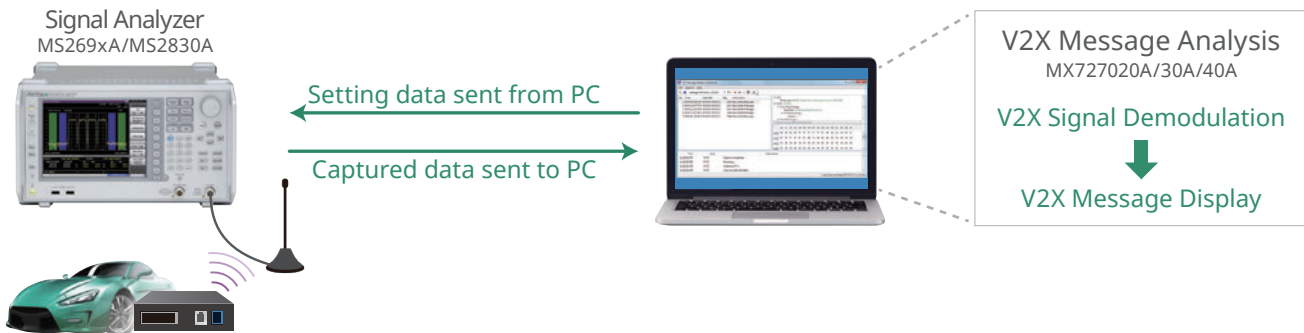


Figure 2: V2X Message Analysis using MX727020A/30A/40A

V2X Message Analysis MX727020A/30A/40A

Evaluations from MAC to Applications Layers/Standard Tools for, United States, Europe and Japanese Message Definitions

Due to different standard in US, Europe and Japan, the developers need to develop V2X Message stack for all regions. The V2X Message Analysis MX727020A/30A/40A supports the safety message definition of US, Europe and Japanese standard, and also supports the wide-ranging evaluation from MAC to Application layers which are extremely difficult to analyze using wireless two-way testing. This means that not only can V2X messages be evaluated in-house with no need to visit Plugfest events and/or perform field tests, but also test engineers have a “magic wand” for improving V2X product quality and cutting development and test man hours. Message definitions that can be evaluated are listed in Figure 3.

	 United States		 Europe	 Japan
Specific Application	User Data		<i>ETSI TS101 539-1</i> Safety Apps RHS	<i>ITS Forum RC-013</i> V2I Message V2V Message
Common Application	<i>IEEE1609.3</i> WSA	<i>SAE J2735-2016</i> BSM, CSR, EVA, ICA, NMEA, PSM, PDM, PVD, RSA, RTCM, TIM, SPAT, MAP, SRM, SSM	<i>ETIS EN302 637-3</i> DEMM	<i>ITS FORUM RC-010</i> <i>Extended Layer</i>
			<i>ETSI EN302 637-2</i> CAM	<i>ARIB STD-T109 Layer 7</i>
Transport /Network	WSM	<i>IEEE1609.2</i> Dot 2 Data Electronical Certificated	<i>ETSI EN302 636-5-1</i> BTP-A BTP-B	<i>ARIB STD-T109</i> <i>IVC-RVC</i>
LLC	LLC	IPv6	<i>IEEE802.2 LLC + SNAP</i>	<i>IEEE802.2 LLC + SNAP</i>
MAC	<i>IEEE802.11 MAC</i> <i>(only WAVE Part)</i>		<i>ETSI TS 102 687.724</i> <i>IEEE802.11 MAC</i>	<i>ARIB STD-T109</i> <i>ARIB MAC</i>
PHY	<i>IEEE 802.11p PHY</i>		<i>ETSI EN 302 663</i> <i>ITS-G5 PHY</i>	<i>ARIB STD-T109</i> <i>ARIB PHY</i>
Band	<i>FCC Title 47 Part 95.150x (OBU)</i> <i>FCC Title 47 Part 90.37x (RSU)</i>		<i>ETSI EN 302 571</i>	<i>Japanese Radio Law</i>

★: Items in black are supported.

Figure 3: Message Definition Evaluations Supported by V2X Message Evaluation MX727020A/30A/40A

Easy-to-Understand Displays of Incorrect Messages from Wireless Equipment

When bugs occur in V2V and V2I complex middleware, it can be extremely difficult to troubleshoot the cause. If the V2X Message Analysis software discovers an error in a supported message definition or an argument in a message definition, the background of the relevant part changes to yellow as shown in the following figure, helping cut debugging time and improve development efficiency.

```

▲ MAC:
  ▲ Frame Control: 0x8800
    Protocol Version: 0
    Type: 0b10 [Data]
    Subtype: 0b1000 [QoS Data]
    To DS: 0b0
    From DS: 0b0
    More Fragments: 0b0
    Retry: 0b0
    Power Management: 0b0
    More Data: 0b0
    Protected Frame: 0b0
    Order: 0b0
    Duration/ID: 0x7800 [120 microseconds]
    Address 1: 0xFFFFFFFF [FF:FF:FF:FF:FF:FF]
    Address 2: 0x000091000001 [00:00:91:00:00:01]
    Address 3: 0x6F1ECFF0E566 [6F:1F:CF:F0:E5:66]
  ▲ Sequence Control: 0x375E
    Fragment Number: 7
    Sequence Number: 1507
  ▲ QoS Control: 0x1B09
    TID: 11 [TSID]
    EOSP: 0b1
    Ack Policy: 0b00 [Normal Ack or Implicit Block Ack Request]
    A-MSDU Present: 0b0
  
```

Figure 4: Undefined Message Display Examples

V2X 802.11p Message Evaluation Software MX727000A Specifications

V2X 802.11p Message Evaluation Software MX727000A

PC	Operating Environment OS: Microsoft Windows 7 SP1 (64-bit) Microsoft Windows 10 (64-bit) Memory: 8 GB min. HDD Free Space: 20 GB min. Screen Resolution: Full HD 1920 × 1080 min Ethernet I/F: 1000BASE-T (RJ-45) ★ Other: National Instruments NI-VISA version 16.0, Microsoft NET Framework version 4.6.2
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V2X Message Analysis MX727020A/30A/40A

Supported Measuring Instruments	Signal Analyze MS2692A/91A/90A, MS2830A The signal analyzer and vector signal generator embedded OS requires Windows 7.
Supported Standards	United States: IEEE802.11-2012, IEEE802.2-1998, IEEE1609.2-2016 (partly), IEEE1609.3-2016, IEEE1609.12-2016, SAR J2735 MAR 2016 Europe: IEEE802.11-2012, IEEE802.2-1998, IEEE802-2014, ETSI EN302 636-4-1 v1.2.1, ETSI EN 302 636-5-1 v1.2.1, ETSI EN 302 637-2 v1.2.1, ETSI EN 302 637-3 v1.2.1, ETSI TS 103 097 v1.2.1 Japan: IEEE Std 802.11-2012, ARIB STD-109 Ver.1.2, ITS Forum RC-010 Ver.1.0, ITS Forum RC-013 Ver.1.0

V2X 802.11p Message Evaluation Software MX727000A Ordering Information

Please specify the model/order number, name and quantity when ordering.
The names listed in the chart below are Order Names.
The actual name of the item may differ from the Order Name.

Model/Order No.	Name
MX727000A	V2X 802.11p Message Evaluation Software
MX727020A	V2X Message Analysis for US Standard
MX727020A-PL016	Message Definition US2016
MX727030A	V2X Message Analysis for EU Standard
MX727030A-PL016	Message Definition EU2016
MX727040A	V2X Message Analysis for Japanese Standard
MX727040A-PL016	Message Definition JP2016

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