Cisco Digital 1-port and 2-port T1 Multi-Flex Voice WICs

Contents

Introduction

The Cisco 1-port and 2-port T1 Multi-Flex Voice/WAN Interface Cards (Multi-Flex VWICs) support voice and data applications on a variety of Cisco multiservice platforms. This list of platforms includes the Cisco 1700, 2600, 2600XM, 2691, 3600, and 3700 multiservice routers, as well as the Cisco VG200, WS-X4604-GWY, C4224, and ICS 7750 voice gateways. Refer to Cisco One and Two Port T1/E1 Multi-Flex Voice/WAN Interface Card for more information on VWICs.
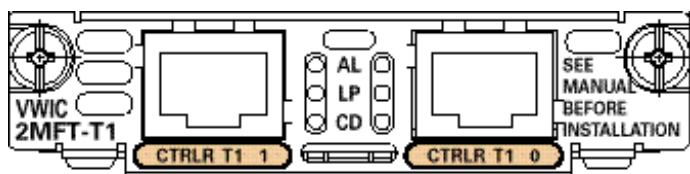
Prerequisities

Requirements

There are no specific requirements for this document.

Components Used

This document is not restricted to specific software and hardware versions.

Conventions

Refer to [Cisco Technical Tips Conventions](#) for more information on document conventions.

Product Numbers

Product Number	Product Description
VWIC-1MFT-T1	1-Port RJ-48 Multi-Flex Trunk - T1
VWIC-2MFT-T1	2-Port RJ-48 Multi-Flex Trunk - T1
VWIC-2MFT-T1-DI	2-Port RJ-48 Multi-Flex Trunk - T1 with drop and insert

Features

Note: The 1-port and 2-port T1 Multi-Flex Trunk VWICs are not like the T1 channel service unit/data service unit (CSU/DSU) (WIC-1DSU-T1). The T1 Multi-Flex Trunk VWICs are can transmit either voice and data or both based on the network module they are installed in and whether Digital Signal Processors (DSPs) exist on the module.

This Multi-Flex Trunk can be used as a Voice Interface Card when combined with appropriate accompanying hardware (such as an NM-HDV, NM-HDV2, an NM-HD-2VE, or an AIM-VOICE-30 and AIM-ATM-VOICE-30 card), or as a WIC (in a WIC slot in the 2600 or 3600). Therefore, it is a Voice WAN Interface Card (VWIC).

The Multi-Flex Trunk provides physical layer T1 access. The capabilities of that T1 interface are determined by the host it is plugged into.

This Multi-Flex Trunk card does not support ISDN data or modem termination in a traditional Network Access Server (NAS) dial scenario. Under specific scenarios, ISDN data and modem connectivity can be possible when the VWIC is used for packet voice, such as in the case of Modem Pass-through and Modem Relay to a peer voice gateway. Such features are beyond the scope of this document.

Note: On the 2-port T1 Multiflex Trunk VWICs there is only one shared clocking domain between the two T1 controllers. This means that if both T1 controllers are configured to derive clocking from the line then the clock references received must be synchronous or timing slips occur on at least one of the controllers. If the clocking sources are pleisochronous and one controller is configured for **clock source line primary** and the other for **clock source line**, then it is likely the second controller will exhibit controlled slips in the output of the **show controllers T1** command. This behavior is a hardware limitation of the 2-port T1 Multi-Flex Trunk VWIC product and is by design. However, independent clocking sources can be supported on the 2-port T1/E1 VWIC2 product when both controllers are used for data-only purposes.

Note: Regarding clocking configurations:

- The **Network clock participate** CLI command is used to synchronize the clocking of the T1/E1 port with the TDM backplane switch. Routers like 2600, 3600, 37xx, 28xx and 38xx have the TDM backplane switch, which supports voice traffic.

- Regarding the importance of the **clock source line independent** command on vwic2-2mft card: With the previous version of VWIC card (VWIC-2MFT-T1), there were some clocking issues when the two ports of the VWIC are connected to two different Telco's. By the introduction of the **independent** option, the clocking can be derived independently for the two ports of the VWIC, which means that these ports are in different clocking domains.

- Regarding the effect of using the **clock source line** command with and without the **independent** option: Even if you have configured **clock source line** on both the ports 0 and 1, the clock derived from port 0 will be loop timed to port 1. For this to work fine, both ports should derive the clock from the same source; otherwise, clock slips will be observed. On the other hand, if you are sure that both ports 0 and 1 are deriving clock from different sources, then the **clock source line independent** command should be given under each port. This enables both the ports to be in independent clocking domain.

- Regarding the need for the **independent** clock source option in VWIC2-2MFT: Whenever two ports on VWIC2-2MFT are used without the **independent** option, the clock derived from port 0 will be loop timed to port 1. In order to avoid clock slips, follow either of these options:

  - The **independent** option should be used on either the ports.

  - The **network-clock-participate** command should be used on the other end of the router. (This option is applicable for back to back connection.)

Digital Voice Telephony

The Multi-Flex Trunk can be used as a Telephony interface for packet voice services when combined with other hardware which can make it voice-capable. Such hardware includes the NM-HDV, NM-HDV2, NM-HD-2VE, AIM-VOICE-30, AIM-ATM-VOICE-30, and certain voice routers with on-board voice DSPs. When the Multi-Flex Trunk is used as a Telephony interface to terminate voice traffic, each DS0 can contain one voice call. The T1 signaling capability (T1 CAS, ISDN PRI) is determined by the accompanying voice network module (if any) and particular multiservice gateway, not the Multi-Flex Trunk itself.

When the card is set up to use ISDN PRI signaling, ISDN data connection is not supported. The card is unable to terminate the ISDN 64 K or 56 K data connection. It only supports voice-call termination when using ISDN PRI signaling. Also, the Multi-Flex Trunk, with or without the accompanying voice-enabling hardware, is unable to terminate a modem connection on the router in a traditional NAS dial scenario.

Cisco 2600/2600XM/2691/3700 Chassis WIC Slot

When the Multi-Flex Trunk is used in the chassis WIC slot, each T1 can be configured with a channel group to generate a virtual serial interface in the running configuration. At most, you can have two channel groups per VWIC. This means that a 1-port VWIC T1 controller can be configured with (at most) two channel-groups, and a 2-port VWIC can be configured with (at most) two channel-groups on one T1 controller or one channel-group per T1 controller.

If the Cisco 2600/2600XM also has an AIM-VOICE-30 or AIM-ATM-VOICE-30 card installed, one T1 controller can be configured as an ISDN PRI or Channel Associated Signaling (CAS) Telephony voice interface. You can configure more than one T1 controller as an ISDN PRI or CAS Telephony voice interface for the Cisco 2691/3700 which can have more than one AIM VOICE card installed.

Note: (i) On the Cisco 2691/3700, you can also have two different ports and ds0-pri-groups mapped to the *same* AIM card's DSPs. You *cannot* do this on the 2600s.

Note: (ii) If you want to mix voice and data on the same VWIC and the VWIC is mapped to the AIM, you *must* use the AIM-ATM-VOICE-30 card. The AIM-VOICE-30 card *only* supports voice. The precise details regarding interface-to-DSP resource mappings are beyond the scope of this document.

NM-1E2W, NM-1E1R2W, and NM-2E2W

The Cisco 3600 NM-1E2W, NM-1E1R2W, and NM-2E2W support one serial channel group per WIC slot. The VWIC-2MFT-T1 is not supported. The VWIC-2MFT-T1-DI is supported, but with one serial channel group.

NM-1FE2W, NM-1FE1R2W, NM-2FE2W, and NM-2W

The NM-1FE2W, NM-1FE1R2W, NM-2FE2W, and NM-2W Network Modules are supported on the Cisco 2691/3600/3700 Multiservice

Routers. Additionally, the NM-2W Network Module is also supported on the Cisco 2600/2600XM Multiservice Routers. When a VWIC is inserted into the WIC slot of one of these network modules, the VWIC can support two serial channel groups per WIC slot.

If the Cisco 2600/2600XM also has an AIM-VOICE-30 or AIM-ATM-VOICE-30 card installed, one T1 controller can be configured as an ISDN PRI or CAS Telephony voice interface. For the Cisco 3660/2691/3700, which can have more than one AIM VOICE card installed, you can configure more than one T1 controller as an ISDN PRI or CAS Telephony voice interface. The precise details regarding interface-to-DSP resource mappings are beyond the scope of this document.

Note: (i) On the Cisco 2691/3700, you can also have two different ports and ds0-pri-groups mapped to the *same* AIM card's DSPs. You are *unable* do this on the Cisco 2600s.

Note: (ii) If you want to mix voice and data on the same VWIC and the VWIC is mapped to the AIM, you *must* use the AIM-ATM-VOICE-30 card. The AIM-VOICE-30 card *only* supports voice.

Cisco 1721/1751/1760 Chassis WIC Slot

The Multi-Flex Trunk can only be installed in the chassis slot0 and slot1 WIC slots. Each T1 can be configured with a channel group to generate a virtual serial interface in the running configuration. At most, you can have two channel groups per VWIC. This means that a 1-port VWIC T1 controller can be configured with (at most) two channel-groups, and a 2-port VWIC can be configured with (at most) two channel-groups on one T1 controller or one channel-group per T1 controller.

If the Cisco 1751/1760 has voice DSPs installed, the Multi-Flex Trunk can be configured as a PRI or CAS voice Telephony interface. A 1-port T1 VWIC can support a single full PRI or a fractional PRI and a channel-group. A 2-port T1 VWIC can support up to two PRIs or one PRI and one channel-group.

Cisco WS-X4604-GWY, C4224, and ICS7750 WIC Slots

When inserted into the WIC slot of these Cisco devices, the VWIC Multi-Flex Trunk can be configured for either data or voice services. Consult the technical documentation for each of these products to determine specifics regarding the total number of channel-groups supported per T1 controller and the permissible combinations of voice and data groups on 2-port VWICs. For example:

- Configuring the Cisco ICS 7750 specifies that a data-only VWIC should only be configured for a single channel-group. This is discussed in the Configuring VWICs for Data-Only Transmission section. Configuring MRP and ASI Cards discusses more details regarding voice on the ICS 7750 (see the Configuring Digital Voice Ports section).

- The capabilities of the VWIC Multi-Flex Trunk cards on the WS-X4604-GWY are discussed in WS-X4604-GWY: Access Gateway Module (AGM) for Catalyst 4000 Series Switches and the Cisco Catalyst 4500 Series Access Gateway Module Data Sheet.

- The capabilities of the VWIC Multi-Flex Trunk cards on the Cisco C4224 are discussed in the Catalyst 4224 Access Gateway Switch Software Configuration Guide, specifically the Configuring the Data Interfaces and Configuring the Voice Interfaces sections.

Two or more Channel Groups On One Port

- Requirements:

    ❍ Cisco IOS® Software Release 12.1(1)T or later on the Cisco 2600

    ❍ Cisco IOS Software Releases 12.1(2)XH or 12.1(3)T or later on the Cisco 3620, 3640, and 3660 platforms

    ❍ Cisco IOS Software Release 12.2(8)T or later on the Cisco 2691 and 3700 platforms
- Two channel groups on one port supported in Cisco 2600, 2691, and 3700 chassis WIC slots

- Not supported on NM-1E2W, NM-2E2W, or NM-1E1R2W

- Supported on NM-1FE2W, NM-2FE2W, NM-1FE1R2W, and NM-2W

- The WIC slot still supports a maximum of two serial channel groups. When the 2 channel group mode is enabled, only one physical port is supported by the WIC slot. Add/Drop multiplexing is still supported in this mode since only one port terminates on the router.

- The NM-HD-2VE and NM-HDV2 supports up to 32 channel-groups, and with the AIM-ATM-VOICE-30 card you can do a channel-group per timeslot (for example, 60).

Drop and Insert

- The Drop and Insert (D&I) feature allows DS0 timeslots to be taken off one T1 interface and inserted into time slots of the other T1 interface. This feature is available in VIC and WIC applications.

  ❍ Drop and Insert functionality does *not* support different framing and line coding on the two ports. Therefore, when a tdm-group is configured on the controller T1 or E1, the framing type between the two controllers must be the same. This is only for the tdm-group functionality of the VWIC card.

    Note: If you do configure two different framing types, this is the error message that the IOS sends to the console of the router:

    ```
    Voice_Router (config)#connect TDM t1 0/1 t1 0/2 %CONN TDM:
    Framing type mismatch %CONN TDM: Endpoints are incompatible
    %CONN: Invalid Command
    ```

  ❍ Drop and Insert timeslots do not need to be contiguous.

  ❍ Drop and Insert of timeslots must be on the T1 controllers on the same 2-port VWIC, unless the gateway is Multiservice Interchange (MIX) enabled. When a gateway is MIX-enabled and the proper TDM network clock participation is configured, Drop and Insert of timeslots between T1 controllers on different VWICs is possible. Refer to Multiservice Interchange (MIX) for Cisco 3600 Series Multiservice Platforms for more details.

  ❍ Drop and Insert uses tdm-groups.

  ❍ Drop and Insert on a PRI can only be done if the entire PRI, including its D-channel is D&I'd. If individual channels must be D&I'd and other channel terminated, you cannot use PRI, you need to use CAS.

Additional Features

- BERT support requires Cisco IOS Software 12.1(1)T or later releases. Refer to V.54/BERT Multi-SCC for 1- and 2-Port T1/E1 Multiflex VWICs for more details.

- V.54 loopback requires Cisco IOS Software 12.1(1)T or later releases. Refer to V.54/BERT Multi-SCC for 1- and 2-Port T1/E1 Multiflex VWICs for more details.

Configuration

The T1 Multi-Flex Trunk ports are not configured like the T1 CSU/DSU WIC (WIC-1DSU-T1). The T1 Multi-Flex Trunk ports are configured as **controller t1 <slot>/<port>** similar to the Channelized T1/ISDN PRI Network Module. This does not mean that the VWIC supports ISDN PRI. Protocol support depends on the host.

Note: The commands to configure Voice over IP (VoIP) on Cisco routers are very similar on all of the router platforms in the Platform

Platform Support

This table shows which routers support the 1 and 2 Port T1 Multi-Flex Trunk Voice/WAN Interface Cards including Cisco IOS® Software Release support selection.

IOS Support / Carrier Module	1600	1721	1751/1760	VG200	2600, 2600XM				3620, 3640, 3660			
	Not Required	Not Required	Not Required	NM-HDV	Chassis WIC Slot	NM-2W	NM-HDV	AIM-VOICE-30[7]	NM-1E2W, NM-1E1R2W, NM-2E2W	NM-1FE2W, NM-1FE1R2W, NM-2FE2W, NM-2W	NM-HDV	AIM-VOICE-30 [8]
VWIC-1MFT-T1	Not Supported	12.2(8)YJ[5]	12.2(4)YB[4]	12.1(3)T	12.0(5)XK, 12.0(7)T, 12.1, 12.1T, 12.2, 12.2T	12.0(7)XK, 12.1(1)T, 12.2, 12.2T	12.0(5)XK, 12.1, 12.1T, 12.2, 12.2T	12.2(2)XB,12.2(8)T, 12.2(8)T1[6]	12.0(5)XK[2], 12.0(7)T, 12.1, 12.1T, 12.2, 12.2T	12.0(7)XK, 12.1(1)T, 12.2, 12.2T	12.0(5)XK, 12.0(7)T, 12.1, 12.1T, 12.2, 12.2T	12.2(2)XB, 12.2(8)T, 12.2(8)T1
VWIC-2MFT-T1	Not Supported	12.2(8)YJ[5]	12.2(4)YB[4]	12.1(3)T	12.0(5)XK, 12.0(7)T, 12.1, 12.1T, 12.2, 12.2T	12.0(7)XK, 12.1(1)T, 12.2, 12.2T	12.0(5)XK, 12.1, 12.1T, 12.2, 12.2T	12.2(2)XB,12.2(8)T, 12.2(8)T1[6]	Not supported	12.0(7)XK, 12.1(1)T, 12.2, 12.2T	12.0(5)XK, 12.0(7)T, 12.1, 12.1T, 12.2, 12.2T	12.2(2)XB, 12.2(8)T, 12.2(8)T1
VWIC-2MFT-T1-DI	Not Supported	12.2(8)YJ[5]	12.2(4)YB[4]	12.1(3)T	12.0(5)XK, 12.0(7)T, 12.1, 12.1T, 12.2, 12.2T	12.0(7)XK, 12.1(1)T, 12.2, 12.2T	12.0(5)XK, 12.1, 12.1T, 12.2, 12.2T	12.2(2)XB,12.2(8)T, 12.2(8)T1[6]	12.0(5)XK[1, 2] 12.0(7)T, 12.1, 12.1T, 12.2, 12.2T	12.0(7)XK, 12.1(1)T, 12.2, 12.2T	12.0(5)XK, 12.0(7)T, 12.1, 12.1T, 12.2, 12.2T	12.2(2)XB, 12.2(8)T, 12.2(8)T1

[1]— Only 1 serial channel group is supported.

[2]—Not supported on Cisco 3660 with NM-1E1R2W, NM-1E2W, NM-2E2W in any Cisco IOS Software release.

[4]—Not supported in Cisco 1750. Cisco 1751 and 1760 support only voice applications in Cisco IOS Software Release 12.2(4)YB. Support for data and/or voice applications requires Cisco IOS Software Release 12.2(8)YJ. Refer to Cisco 1700 Series - Cisco IOS Release 12.2(4)YB.

[5]—Not supported in Cisco 1710 or 1720. Data only support for the Cisco 1721. Refer to Cisco IOS Software Release 12.2(8)YJ, Product Bulletin No. 1806.

[6]—2600XM platforms

[7]—The VWIC must be inserted into a chassis WIC slot or into an appropriate NM-xFEyR2W network module. On the Cisco 2600/2600XM only one T1 controller can be configured with a voice group; other platforms such as the Cisco 3660 (with MIX capability), 2691, and 3700 can have both T1 controllers on a 2-port VWIC configured for voice groups.

[8]—Cisco 3660 *only* with MIX capable chassis

A note on MIX capable chassis: MIX-capable platforms include the Cisco 2691, 3725, and 3745. The Cisco 3660 can be made MIX-capable with the installation of a MIX-3660-64 unit.

IOS Support	2600XM, 2691, 3725, 3745						3631	Catalyst 4000	Catalyst 4224	ICS7750
Carrier Module	Chassis WIC Slot	NM-1FE2W, NM-1FE1R2W, NM-2FE2W, NM-2W	NM-HDV	NM-HD-2VE[12]	NM-HDV2[13]	AIM-VOICE-30	Chassis WIC Slot	WS-X4604 AGM	Chassis WIC Slot	Multiservice Route Processor (MRP)
VWIC-1MFT-T1	All IOS Versions	All IOS Versions	All IOS Versions	12.2 (15) ZJ,12.3 (4)T	12.3(7)T	12.2(11) YT[10], 12.2(13) T[11]	All IOS Versions	12.1(3a) XI	12.1(5) YE, 12.2 (2)YC, 12.2(13) T	12.1(3a)XI
VWIC-2MFT-T1	All IOS Versions	All IOS Versions	All IOS Versions	12.2 (15) ZJ,12.3 (4)T	12.3(7)T	12.2(11) YT[9, 10], 12.2(13) T[11]	All IOS Versions	12.1(3a) XI	12.1(5) YE, 12.2 (2)YC, 12.2(13) T	12.1(3a)XI
VWIC-2MFT-T1-DI	All IOS Versions	All IOS Versions	All IOS Versions	12.2 (15) ZJ,12.3 (4)T	12.3(7)T	12.2(11) YT[9,10] 12.2(13) T[11]	All IOS Versions	12.1(3a) XI	12.1(5) YE, 12.2 (2)YC, 12.2(13) T	12.1(3a)XI

[9]—Two AIM-VOICE-30 are needed to support this VWIC if both T1 controllers are to support full voice groups (all timeslots).
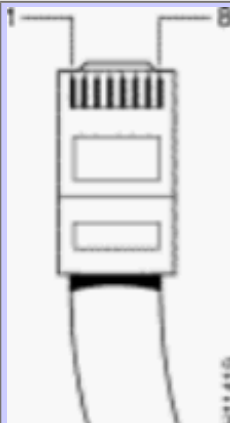
[10]—Cisco 2691

[11]—Cisco 3700 platforms

[12]—NM-HD-2VE only supported on Cisco 3660, 3640, 2600XM, 2691, and 37xx but not on Cisco 2600 and 3620/3640 platforms.

[13]—NM-HDV2 supported only on Cisco 2600xm, 37xx, and 2691

Note: The Cisco IOS Software releases provided are typically the minimum version required to support the platform, module or feature in question. Use the Software Advisor tool to find out a complete list of Cisco IOS Software release a feature, module, interface card, or chassis is supported in.

Digital Voice Port Pinout (RJ-48C)

PIN	Signal	
1	RX ring	
2	RX tip	
3	not used	
4	TX ring	
5	TX tip	
6	not used	
7	not used	
8	not used	

Note: The RJ-48C receptacles on the MFT are pinned out as customer premises equipment (CPE), rather than central office equipment. Use a T1/E1 crossover cable to connect to another CPE pinned out equipment (for example PBXs).

Related Information

- **Voice Hardware Compatibility Matrix for Cisco 1750, 2600, 3600 and VG200 Routers and Catalyst 4000, 5000 and 6000 Switches**
- **Voice Technology Support**
- **Voice and IP Communications Product Support**
- **Recommended Reading: Troubleshooting Cisco IP Telephony**
- **Technical Support & Documentation- Cisco Systems**