Ordering ISDN PRI for use with Telos Series 2101

12 Feb, 2009

This Document provides information to help order ISDN Telco Trunks used with the Series 2101 Hub.

For additional information about ordering PRI service, you can call your Account Representative at your regional telecommunications company or other local exchange carrier for assistance. Telephone numbers for a number of carriers in the USA & Canada are listed later in this document.

1 Service Ordering Overview

The general steps for provisioning PRI service for your 2101 are listed below.

Contact a telephone service provider to order PRI ISDN service. Telephone numbers for ordering PRI ISDN service providers are listed below. Be sure to get the following information from the Telco before you attempt to use the PRI:

SWITCH TYPE

This is the brand and model of telephone switching equipment used by the Telco in their central office (CO) to provide the PRI Service. See also *Variant for Switch Type*, below.

VARIANT FOR SWITCH TYPE

This is the specific ISDN protocol used by the CO switch for this ISDN line. Some switches support more than one type of protocol. The combination of *Switch Type* and *Variant* defines the specific protocol to be used on the 2101.

LINE FRAME FORMAT

PRI circuits use Extended Superframe (sometimes called ESF) line formatting. The type of framing used is determined by your Telco. ESF is preferred in the USA & Canada. The preferred frame format for E1 or E1-based PRI is CRC-4 Multiframe with Si=FEBE.

LINE CODING

The clock signal for PRI (T1) is derived at the far end from the data bits themselves. Therefore, T1 lines have certain restrictions as to the data allowed. No more than 15 zeros shall be sent in a row; and average density of 12.5% ones must be maintained. The NCTE/CSU is responsible to ensure that these requirements are met. The line encoding method, AMI or B8ZS determines exactly how these requirements are met. B8ZS is preferred as it allows complete recovery of the original data at the far end.

Your Telco will determine the method used on a specific circuit. B8ZS is preferred in the USA and Canada. E1 circuits have similar restrictions. HDB8 is preferred for E1 circuits.

Having correct and complete information about the above items is essential to successful PRI ISDN service with the Series 2101 Hub.

IMPORTANT!

Users in the USA, Canada & certain other countries are expected to provide a Network Channel Terminating Equipment (Channel Service Unit or CSU). You must purchase this separately and it should be installed according to the manufacturer's recommendations.

We suggest purchasing a unit that uses 8-position 8-pin (RJ-45 style) connectors to simplify connection.

INCOMING DIGITS

The 2101 will use the incoming “Called Party Number” to route the call to a particular active 2101 “Show”. Series 2101 can support any number of digits for the Called Party Number. You will need to use the same number of digits when creating your show configurations. For this reason, we prefer the full number be delivered (in the USA & Canada this would be 10 digits). If the Telco prefers to send only 7, 4, or 3 digits, this presents no problem. In those cases, simply use the appropriate number of digits when creating your 2101 “show configurations”.

CHANNEL SELECTION

Telco should send calls to the 2101 beginning with the lowest number channel and working upwards (bottom-up linear hunt). 2101 uses top-down linear hunt for outbound calls.

PRI TRUNK GROUPS (Group Sizing, Virtual Facilities Groups)

Series 2101 systems are likely to be flooded with large numbers of incoming calls when you run a contest or a talk show. This can fill all capacity on the PRI, making outbound calls impossible. Trunk groups allow you to prevent this problem by reserving certain channels for use with a number (or numbers) that are not associated with your call-in numbers. To better understand how this works, read the following examples.

IMPORTANT!

Telos Systems recommends using Trunk Groups (also sometime called "Group Sizing" or "Virtual Facilities Groups") to ensure proper operation during heavy inbound call traffic. Not all Telco's use these exact terms, so you'll need to explain that you want certain numbers to ring busy after a certain number of calls so you can make outbound calls on other channels.

Failure to do so may result in the inability to place outbound calls during contest or call in shows.

See below for a detailed explanation.

Each incoming call on a PRI is assigned a PRI channel by the Telco switch. The Telco switch has no way of knowing that we do not have available additional “call appearances” for that number. In this case the 2101 “rejects” the call, and the channel is released within a few hundreds of milliseconds. This means that a large number of calls into the system can prevent access for outbound calls, even if they are associated with a different “show configuration” or “call appearance”. Therefore, a way to restrict the number of call setup messages coming from the Telco is desirable. In the USA, the mechanism to do this is to create multiple “trunk groups” (5ESS) or to use “group sizing” (DMS-100) on the PRI to restrict the number of inbound calls to a specified number(s). Not all Telco’s use these same terms, so you may need to explain. In the UK a similar function is called “Virtual Facilities Grouping”.

This strategy is particularly needed in the usual case where the number of “appearances” of a particular number is substantially less than the number of channels of the PRI (23 in the USA & Canada and 30 in most other countries). Let’s use an example to explain how this works:

Let’s assume we have a 2101 with three telephone numbers using a 23 B channel PRI (USA).

1111 Hotline

2222 Warm line

3333 Contest line

One studio exists, with 10 appearances of 3333 and one appearance each of 1111 and 2222.

If this were an analog system, the Hotline and Warm line would not be lines from the “choke exchange”. Therefore, we would not need to worry that the Hot or Warm lines could be affected by heavy contest calling on the contest lines by this station (or some other station on the choke exchange). We could use either of these channels for outbound dialing even if the Contest line number was flooded with calls.

However, in the PRI example above, the following could very well happen during periods of high contest traffic. The Hotline and Warm line could go from the "Idle" status (dot icon) to the "no-line" status (blank icon) or “in use elsewhere” status (x icon), depending on the software version. This is in spite of the fact that the 2101 show configuration is only configured for a total of 12 “lines”.

This is a natural result of the following facts:

A) There is little or no “choking” in this scenario outside of the 2101 – every incoming call will be passed to the 2101.

B) Each incoming call is assigned, temporarily, a PRI B channel until it is rejected by the 2101.

Consequently, the first 10 calls come through, and are put in "ringing" status for the lines assigned to line 3333 of the system. The next 13 calls fill up all remaining channels of the PRI. At this point, the Telco will give additional callers a *Fast Busy* Signal (Network Unavailable in the UK). However, at this point there are no available channels, so the icons for lines 1111 and 2222 will show as unavailable to reflect that there are no longer channels available.

However, since a contest is underway, as soon as the 2101 "rejects" one of these additional 13 calls, the Telco will pass us a new call for that idle channel. Hence the congestion continues.

Only after call volume has diminished, would lines 1111 and 2222 return to the idle state. This is normal, if the system is configured as described above. It can be a bit surprising to see the icons change, but it is "expected" behavior. This behavior is not unique to the Series 2101, and would be seen on any PRI-based telephone system under these circumstances.

There is a solution. Here's how this would work for our example:

- Trunk Group 1 has 2 channels and 2 phone numbers: 1111 and 2222
- Trunk group 2 has 10 channels and 1 phone number: 3333

Now the drawback is that we cannot later make a new show configuration with greater than 10 appearances of 3333 (we could, but we would never get more than 10 calls).

Therefore, we might wish to create a third trunk group and give it another number, 4444 so we have the ability to use more of the PRI, perhaps for another studio.

We could then have contests simultaneously on 4444 and on 3333 and still never interfere with 1111 and 2222 since 10+10+2 is less than 23.

Prior to ordering your PRI be sure to give this some thought, as the total number of channels across the trunk groups cannot exceed 23 (assuming a single USA PRI, the number would be 30 for ETS-300 PRI's). One of the advantages of Series 2101 is flexibility, and shared facilities can save money. In some cases, a certain degree of overlap may be acceptable. Here is a more sophisticated example, where 2 stations (and AM and an FM) share a 2101.

1111 Hot line for AM

1112 Warm Line AM

1113 AM Morning Show

1114 AM Afternoon Show

2221 Hot line for FM

2222 Warm line FM

2223 FM Morning Show

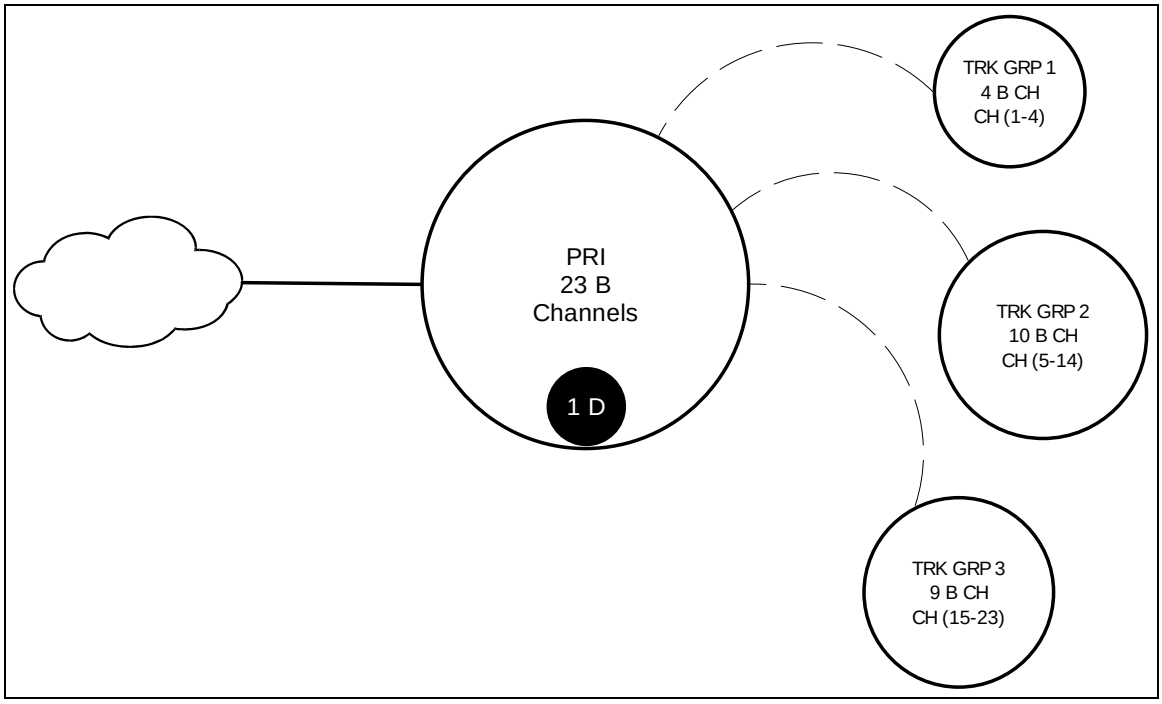
2224 FM Afternoon show

We could configure the PRI trunk groups as follows, and still be conservative (we have shown specific channel numbers assigned by the Telco for each Trunk Group to can illustrate this example more completely):

- Trunk Group 1:
  - Number of channels: 4 (e.g. B channels 1-4)
  - Phone numbers: 1111, 1112, 2221, and 2222

- Trunk Group 2:
  - Number of channels: 10 (e.g. B channels 5-14)
  - Phone numbers: 1113 and 1114 (we can assume that the morning show and the afternoon show won't be on at the same time and therefore the two numbers won’t interfere with each other)
- Trunk Group 3
  - Number of channels: 9 (e.g. B channels 15-23)
  - Phone numbers: 2223 and 2224 (same assumption here)

This arrangement is shown diagrammatically, below.



The Telco will return a busy signal to calls for any number in a specific trunk group if there are no channels available in that trunk group. This is by the Telco, and prevents the temporary assignment of a channel until the 2101 “rejects” the call. The 2101 receives no more calls for those numbers until it frees up a channel. This solves our dilemma, we simply must make sure that numbers are intelligently split across trunk groups.

Of course we’d also configure the 2101’s “show configurations” to reflect the correct number of “appearances” for each number.

The trunk groups created by the Telco will only affect how incoming calls are treated. In order for this to work as intended, we must make sure outbound calls are made on channels reserved for the same trunk group. This is accomplished using the *Channel* field in the 2101 *Trunk Configuration* web page.

We could be a bit bolder, if we wish, if we know, for example, that both the AM and FM will rarely, if ever, have heavy usage at the same time. However, we would have to accept that occasionally one station could potentially swamp out the other. The simplest (and safest) overlap scenario is shown below:

- Trunk Group 1:
  - Number of channels: 3 (Channels 1-3)
  - Phone numbers: 1111, 1112, 2221, and 2222

  Note: you will never be able to call into both hotlines and both warm lines, just 3 of the 4 total).
- Trunk Group 2:
  - Number of channels: 10 (Channels 4-13)
  - Phone numbers:1113 and 1114 (we can assume that the morning show and the afternoon show won't be on at the same time).
- Trunk Group 3
  - Number of channels: 10 (Channels 14-23)
  - Phone numbers: 2223 and 2224 (same assumption here).

Of course, other scenarios are possible. Just remember that you can usually have as many groups as you want, however the total number of channels (from all of the groups) must not exceed the total number of channels (23 or 30). Each group can have as many phone numbers assigned to it as you like, however having more than one number assigned to the same group creates the possibility of causing the all-channels-in-use phenomenon described above.

As we said earlier, you'll need to discuss this with your Telco representative. If they don't understand exactly what you are referring to, just make the point that what you want to do is to prevent calls to a single number from blocking all PRI channels. After all, you might need to make an emergency call on the Hot or Warm line even if a contest was in progress.

WHOM TO CALL

You may order PRI service from either your local telephone company or a long distance carrier. Check with your business account executive first. If they are unsure, you can try one of the numbers below.

COMPANY	TELEPHONE NUMBER	WORLDWIDE WEB
AT&T	800-248-3632	www.att.com
Bell Atlantic North	See Verizon	
Bell South	See AT&T	
Cincinnati Bell	Sales: 513-566-5050	www.cincinnatibell.com
	Customer Service: 513-397-1616	
GTE	See Verizon	
Natco	800-775-6682	www.natconet.com
Nevada Bell/SBC	See AT&T	
Pacific Bell/SBC	See AT&T	
Rochester Tel	Rochester IN: 574-223-2191	www.rtc1.com
	Akron IN: 574-598-2782	
Bell Canada	Ontario: 310-2355	www.bell.ca
	Quebec: 310-7070	
	Outside Ontario/Quebec and within North America: 800-668-6878	
	Alberta or British Columbia: 888-333-2811	
Southwestern Bell	See AT&T	
Qwest (formerly US West)		www.qwest.com
	800-743-3793	
	800-777-9594	
Verizon (formerly SBC companies, some Bell companies, and GTE)		
	877-297-7816	www.verizonbusiness.com

For countries outside of the USA see: www.gbmarks.com/html/international.html

2 NTCE, Clocking, power and other issues

NETWORK CHANNEL TERMINATING EQUIPMENT (NCTE or CSU)

Each T1 or E1 must be terminated by a device generically referred to as a Network Channel Terminating Equipment (NCTE). The NCTE performs several functions including:

- Line amplification and conditioning of the signal
- Protects your 2101 Telco Trunk Interface Cards from overvoltage or transients present on the digital circuit.
- Protects the digital circuit from possible problems due a malfunctioning Telco Interface Card or 2101 Hub.
- Provides various diagnostic capabilities such as error reporting and loopback modes to allow the Telco to test your line.
- Provides a signal when the 2101 Hub is turned off or disconnected, preventing “alarms” at the Telco Central office. This is important since the Telco may “busy out” (turn off) your T1 if such alarms persist. For this reason a NCTE should be powered from an uninterruptible source of power.

HOT TIP!

Keeping a live NCTE on the line will prevent the Telco from turning off a T1, or the physical layer of a PRI.

However, the Telcos frequently will "turn off the D channel" on a PRI that is idle for more than a few hours. Be sure to get the number to call at the phone company central office to get this turned back on in case this happens.

Also, you should not turn off your 2101 Hub for extended periods due to this issue.

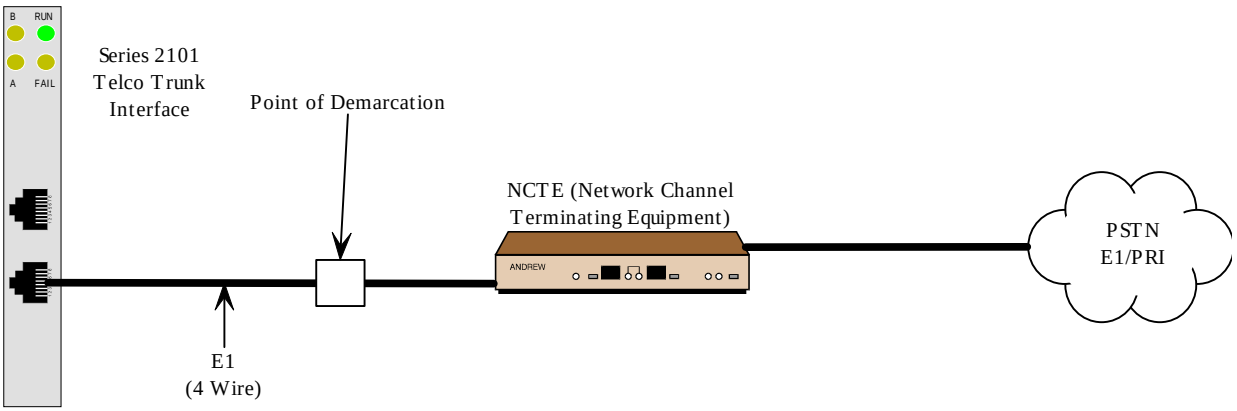
In most countries, this equipment is provided by the Telco, and is often powered by them. In the USA & Canada, the NCTE is called a CSU (Channel Service Unit) and is provided by the end user and you are responsible for powering it (see Volume 1 Part II Section 2.1 and volume 2, Part III Section 3.1.1 of the 2101 user’s manual). Be aware that not all CSUs include a power supply, so you should investigate this before purchasing a unit. Volume 2 Part II Section 2.1 lists a source for suitable CSUs.

Customers in countries (such as the USA) where the user must provide the NCTE should be sure to order this. Check with your sales person to see if this was included in the sales order.

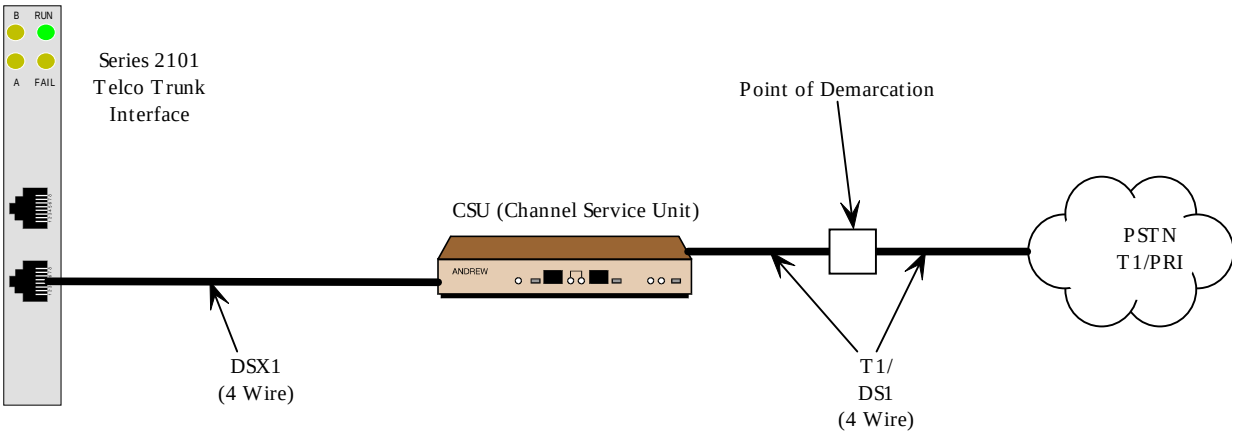
NOTE: The CSU records error statistics every 15 minutes. It is advantageous, for troubleshooting purposes, to have a CSU than can display this information, or has a serial port for access via a computer.

Wiring the Network Channel Terminating Equipment (NCTE) or Channel Service Unit (CSU)

See below for information on NCTE. The Trunk cards in the Series 2101 hub must be connected to the digital trunk circuits from the Telco as shown. The point where customer owned equipment interfaces to the telephone network is often referred to as the "point of demarcation" or "demarc". Depending on the on local practices, the demarc will be on one side or the other of the NCTE as shown below.



Outside the USA and Canada the NCTE is generally the responsibility of the Telco. Therefore, the handoff from the Telco to the end user (the point of demarcation) is after the NCTE.



In the USA and Canada, the NCTE is called a CSU (Channel Service Unit), and is the responsibility of the end user. Therefore, the handoff from the Telco to the end user (the point of demarcation) is before the CSU.

HOT TIP!

Some service providers sell or lease their own CSUs, and they may require you to use their equipment.

CLOCKING

The Series 2101 expects to derive clock from the E1/T1 PRI from the Telco. Since all trunks from the Telco are clocked from the same controlled precision clocks, this works fine.

In the rare cases where the Series 2101 has connections to a PBX as well as the Telco the Series 2101 should be clocked from the Telco only. In this case, the PBX must also be clocked to the Telco.

In the case where the 2101 is connected only to a PBX, then clock will be from the PBX. In this case the PBX must derive clocking from the Telco, not from the Series 2101 Hub.

The 2101 Hub derives clock from the lower port of the card, so if only one PRI is present it should use this port. If multiple PRI cards are present customer support can help you determine which card is the clock master.

In summary, the Series 2101 normally slaves off the network (Telco clock) either directly or indirectly. Failure to provide proper clocking will cause “clicks” due to buffer overflow/underflow on the digital trunk links.

POWER to NCTE/CSU

The Series 2101 trunk interface is powered by the system. It does not use or provide power. The Telco will normally arrange for power to the NCTE if they own it. They should tell you if a source of power is required. If power is required a separate power source would be required since the 2101 does not provide power.

In the USA, Canada, and other locations with customer provided CSU’s or NCTE’s this equipment must be provided power. Not all CSU manufacturers provide the power source with the CSU, so be sure to check this when purchasing a CSU.

You should purchase a CSU with an internal backup battery or plug the CSU into an Uninterruptible Power Supply (UPS). Battery backup ensures that the CSU continues to exchange signals with the CO even if your site loses power. The CSU should remain powered at all times to prevent service disruptions. If the CSU loses power and stops transmitting signals, the CO switch reports a Red Alarm on the line. If this condition persists, the service provider may “busy out” your line. In this situation, you will have to call the service provider to restore your service.

3 ISDN PRI Service Order Summary

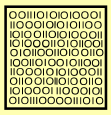
WHAT TO ORDER-USA & CANADA

Ordering a PRI ISDN line is similar to ordering a T1 line; there are few features or options to consider. When you call to order PRI service, ask for Primary Rate ISDN (23B+D) service provisioned as follows. See order forms later in this chapter.

- Extended Superframe (ESF) framing
- B8ZS line coding.

- Each B-channel provisioned for circuit-switched voice (CSV).
- The D-channel on channel 24 of the PRI.
- No packet handlers other than the D-channel. Some service providers offer special packet data transfer capabilities (such as X.25 messages) over the D-channel; these capabilities are not usable with the Series 2101 and could interrupt service.
- 64 kbps clear channel service end-to-end for every call. Calls that start on ISDN lines may be routed over older T1 digital lines that use a different form of call signaling that “robs” bits from the channel. This bit robbing reduces the available channel bandwidth to 56 kbps. If your service provider can not guarantee clear channel service, you may need to turn on rate adaption.
- ISDN Protocol; one of the following protocols configured as Layer 2 master and as an ISDN LT (Line Termination – CO emulation):
  - Lucent 5ESS Switch; Lucent 5ESS Custom, National ISDN-1, or National ISDN-2.
  - Nortel DMS 100 Switch; Nortel DMS Custom, National ISDN-1, or *National ISDN-2.

    * See special note on ISDN order forms for the DMS switch and National ISDN-2.
  - Siemens EWSD; National ISDN-1.



ISDN TIP!

Some customers of AT&T have been offered ISDN service off the Lucent 4ESS switch, a long distance switch.

Since the 4ESS ISDN PRI is not conformant with the Bellcore 'National ISDN' or Lucent 'Custom 5ESS' ISDN standards, we do not recommend this option. In some cases, AT&T can give you service off a 5ESS switch. Be sure to be clear about this matter, as several customers have been told that the 4ESS protocol is "the same as the 5ESS protocol" which is simply not true.

See ISDN order forms for the USA & Canada, later in this document, and be sure to send them to your Telco representative when ordering PRI.

WHAT TO ORDER *OUTSIDE* THE USA & CANADA

Use the following information for countries that use the “Euro-ISDN” protocol. If you are outside the USA and your Telco does not provide “Euro-ISDN” according to the ETS-300 protocol, please contact your Telos Representative.

Ordering a PRI ISDN line is similar to ordering a E1 circuit; there are few features or options to consider. When you call to order PRI service, ask for Primary Rate ISDN (30B+D or ISDN-30) service provisioned as follows. See order forms later in this chapter.

- CRC-4 Multiframe with Si=FEBE (far end block error) framing.
- HDB3 line coding.

- LAPD signaling; D channel/sync on Channel 16 and 31.
- Each B-channel provisioned for circuit-switched voice (CSV).
- No packet handlers other than the D-channel. Some service providers offer special packet data transfer capabilities (such as X.25 messages) over the D-channel; these capabilities are not usable with the Series 2101 and could interrupt service.
- ISDN Protocol; The following protocol, configured as Layer 2 Master and as LT (Public Network Switch)
    - ETS-300 (ITU-T) compliant

See ISDN order forms for the Euro ISDN, later in this document.

FAXABLE ISDN ORDER FORMS For PRI ISDN circuits in the USA & Canada

Following forms should be used to place orders for PRI ISDN circuits in the USA & Canada. Since ISDN can be complex, it is necessary to use these forms or you may experience problems. These should give the phone company all of the information they need. *The majority of installations, if ordered in writing, with this information, go smoothly*. If you do experience problems Telos technical support is here to help. You may also wish to look at our troubleshooting information in the 2101 manual.

You will need to order Trunk Groups (or *Group Sizing*), or other means of restricting inbound traffic to specific numbers, or you will not be able to dial outbound during heavy periods of inbound period. You must discuss this with your Telco at the time you place the order. Please read the examples earlier in this document for more on this.

Complete the top portion of the form and send both pages to the phone company. Keep the form handy and show it to the installer when he or she puts in your line and ask the installer to verify with the switch programmer (at the central office) that your line is configured as ordered.

ISDN PRI LINE ORDERING INFORMATION
USA & Canada
Telos Series 2101

To: Telephone Company

Attention:_____

From:	Location for line:
Company:_____	Company: _____
Address: _____	Address:_____
City/State/ZIP:_____	City/State/ZIP:_____
Phone:_____	Phone:_____
Contact: _____	Contact:_____
Long distance carrier:_____	Number of PRI circuits required: ___

Number of Telephone Numbers (DID numbers) needed: _____

Date needed: _____

We request the above number of ISDN Primary Rate Interface (PRI) circuits for use with the Telos Series 2101 digital telephone system. This device interfaces audio equipment to digital telephone services. It *requires* Circuit Switched Voice (CSV).

The Series 2101 has an integral PRI ISDN interface that supports these protocols:

AT&T 5ESS:
- -Custom 5ESS *
- -National ISDN-1
- -National ISDN-2
- * Not on a 4ESS switch. See previous ISDN TIP for clarification.

Northern Telecom DMS-100:
- -DMS Custom
- -National ISDN-1
- -National ISDN-2 *
- *See Important Note, below.

Siemens EWSD:
- -National ISDN-1

We can use any of the protocols given above. Please let us know which protocol you will provide and the brand and model of switch. If the switch or protocol is not listed above, notify the customer. *NOTE: Proprietary signaling protocols, such as TR 41459 are not supported.*

IMPORTANT NOTE Regarding the DMS-100 switch and National ISDN-2:
Like most CPE, the Telos series 2101 does not support B-channel service messages. Therefore, the DMS-100 *MUST BE* provisioned as follows when using National ISDN-2 protocol with the Series 2101:

> Add *NO_BCH_SERV* to the *SERV* tuple in Table *LTDATA*. By default, service messages are enabled. This setting is only applicable to NI-2 Variant.

The customer will provide the CSU unless other arrangements have been made through you. We require a DS1 1.544 mbps 4 wire interface (100 ohms) with a *standard, 8-position 8-pin miniature modular jack (USOC RJ48C)*, of which only the four conductors will be used (see below).

Frame Format: Frame format should be Extended Super Frame (ESF).

Line Coding: Line coding should be B8ZS (Bipolar 8 with Zero Substitution). If this line coding is not available, please notify the customer.

Channel Selection: Telco should send calls to the 2101 beginning with the lowest number channel and working upwards within each trunk group (bottom-up linear hunt).

D Channel: D Channel must be Channel 24. Non-Facilities-Associated Signaling (NFAS) is not supported; one D-channel for each PRI is required.

Modular Jack: The interface to the Series 2101 should be a 8-position 8-pin miniature modular jack (RJ-45 style, USOC RJ-48C) wired as follows:

Pin	Description
1	Receive Ring
2	Receive Tip
3	No Connection
4	Transmit Ring
5	Transmit Tip
6	No Connection
7	No Connection
8	No Connection

Trunk Groups (Group Sizing)**:** The customer may wish to have different DN's in different trunk groups to preserve channels for operations, by preventing calls to their "contest" or "request" numbers from blocking access to and from the operations numbers during periods of high inbound call volume. This must be decided, on a case-by-case basis with your customer. Usually 3-4 special numbers will be associated with one group of 3-4 channels and the remaining numbers assigned to one or two additional groups. *Please review your customer's requirements at the time the PRI is ordered.*

Please provide the customer with the following information prior to installation:

Switch Type and Variant (protocol). Customer needs to know the actual brand and model of the switch as well as the protocol family used. If you will be providing National ISDN-2 from a DMS switch please see "Important Note Regarding DMS" on the previous page.

Directory Numbers/DID numbers: *Please provide the customer with a list of all Telephone numbers (DNs) for this PRI circuit.*

Number of digits for Incoming Calls: Please provide the number of digits that will be sent for Called Party Number on incoming calls. 10 Digits for incoming calls are generally preferred, however any number of digits is acceptable. *Please provide the customers with the number of digits to be used.*

Trunk Groups: If multiple trunk groups are provisioned, *please provide a list of the groups, the size of each, the channels for each, and the DID numbers associated with each.*

You may call the manufacturer of the Series 2101, Telos Systems, at +1 (216) 241-7225 for any additional required information about ISDN compatibility. Ask for Telos Series 2101 Customer Support.

FAXABLE ISDN ORDER FORMS FOR ETS 300 PRI Circuits

Following form may be used to place orders for PRI ISDN (ISDN-30 or S2) circuits in countries using the ETS 300 protocol. This should give the Telecom all of the information they need.

You will need to order Virtual Facilities Groups, or other means of restricting inbound traffic to specific numbers, or you will not be able to dial outbound during heavy periods of inbound period. You must discuss this with your Telco at the time you place the order.

Complete the top portion of the form and send both pages to the Telco.

ISDN PRI LINE ORDERING INFORMATION
ETS 300 (not for use in USA & Canada)
Telos Series 2101

To: Telecom

Attention:_____

From:	Location for line:
Company:_____	Company: _____
Address: _____	Address:_____
City/State/ZIP:_____	City/State/ZIP:_____
Phone:_____	Phone:_____
Contact: _____	Contact:_____
Long distance carrier:_____	Number of ISDN-30 (PRI) circuits required: _____

Number of Directory Numbers (MSN or DID numbers) needed: _____

Date needed: _____

We request the above number of ISDN Primary Rate Interface (ISDN-30, PRI, S2M) circuits for use with the Telos Series 2101 digital telephone system. This device interfaces audio equipment to digital telephone services. It *requires* Circuit Switched Voice (CSV).

The Series 2101 has an integral PRI interface that supports the ETS 300 (Net 3) protocol.

We require a standard E1 (ITU-T G.703) 2.048 mbps 4-wire interface (120 ohms) on a *standard, eight-pin/4-conductor RJ45-style modular jack*, of which only four conductors will be used.

Frame Format: Frame format should be CRC-4 Multiframe with Si = FEBE. If this frame format is not available, please notify the customer.

Line Coding: Line coding should be HDB3 (High Density Bipolar 3). If this line coding is not available, please notify the customer.

Channel Selection: Telco should send calls to the 2101 beginning with the lowest number channel and working upwards within each trunk group (bottom-up linear hunt).

Modular Jack : The interface to the Series 2101 should be 120 Ohm cable terminated in a 8-position 8-pin miniature modular jack (RJ-45 style) wired as follows:

Pin	Description
1	Receive Ring
2	Receive Tip
3	No Connection
4	Transmit Ring
5	Transmit Tip
6	No Connection
7	No Connection
8	No Connection

PRI LAPD Protocol: The series 2101 supports ETS-300 (TS014) protocol.

Virtual Facilities Grouping (Trunk Groups): The customer may wish to have different MSN's in different virtual facilities groups to preserve channels for operations, by preventing calls to their "contest" or "request" numbers from blocking access to the operations numbers during periods of high inbound call volume. This must be decided, on a case-by-case basis with your customer. Usually 3-4 special numbers will be associated with one group of 3-4 channels and the remaining numbers assigned to one or two additional groups. *Please review your customer's requirements at the time the PRI is ordered.*

Please provide the customer with the following information at the time of installation:

Switch Type and Variant: A Public Network Switch (LT/Line Termination) compliant with ETS-300.

MSN Numbers/DID numbers: Please provide the customer with a list of all Telephone numbers for this PRI circuit.

Number of digits on incoming calls: Please provide the number of digits that will be sent for Called Party Number on incoming calls.

Facilities Groups: If multiple Virtual Facilities Groups are provisioned, please provide a list of the groups, the size of each, the channels for each, and the DID numbers associated with each.

You may call the manufacturer of the Series 2101, Telos Systems, in the USA at +1 216 241 7225 for any additional required information about ISDN compatibility. Ask for Telos Series 2101 Customer Support.

Version 6
Echo\\c:\Downloads\2101 Stuff\Commissioning Stuff\Ordering_ISDN_PRIrev6.doc