



ISDN, THE TELOS TWO / TWOx12, AND YOU

- With Order Forms to Fax to the Phone Company -

This document has two sections, one for European users and one for users in the USA and Canada. Please use whichever is appropriate for your specific needs.

1 ISDN BRI Ordering Guide for ETS 300 (Euro-ISDN)

This section applies to users in Europe and other countries where the Euro-ISDN ETS 300 standard is supported (much of South America, Mexico, etc). Since there are virtually no options when ordering Euro ISDN this section is probably not needed, however we thought we could help out by summarizing what you will require.

If you live in a country outside of North America which does not support Euro-ISDN, your local Telos Systems representative should be able to provide you with information about ordering (and using) ISDN in your area. We assume you have read the description of ISDN in section 2.3 and are familiar with ISDN's basic concepts. If you have not read that section, doing so now will help you better understand the information that follows.

On one ISDN BRI circuit, there are three simultaneous bi-directional channels: two 64kbps "bearer" or "B" channels for the transmission of user information and one 16kbps "data" or "D" channel for call set-up and status communication. That is why this is sometimes called 2B+D service. You can use the B channels, but only the phone companies and equipment manufacturers can usually use the D channel. ISDN comes into your facility on two wires, just like plain old telephone service (POTS).

From the perspective of telephone network routing, each channel appears to be a separate line with it's own number and independent dial-out capabilities. Since each has to be dialed or answered separately, they appear to be "lines" to users also. We refer to a B channel as a "line" on the TWOx12's menus and LEDs.

Details, Details

In order to communicate accurately what it is you need, we think you should be familiar with the vocabulary used to describe ISDN. As with anything, for best results, it helps to know what you are talking about. For an in-depth glossary of terminology please check Telos' web site at <http://www.telos-systems.com> .

Names

We've seen Basic Rate Interface ISDN called by a number of names. The term "SØ" is sometimes used as a technical term for ISDN BRI. Of course the term "BRI" is also used, mostly by Telecom technicians. The most common term we've seen in Europe is "ISDN-2".

Multiple Subscriber Numbers (MSN)

These are simply your phone numbers. The number of digits will vary depending on your area. Normally each ISDN BRI circuit will have three MSNs. You will be using only two of them for each ISDN BRI circuit, one for each B channel. You may also hear of a Listed Directory Number or LDN. This is simply the primary number for lines in a hunt group (see below). The LDN need not necessarily be entered in the unit (although it would be if it is also one of your MSN's).

CSD and CSV

Recall that each ISDN BRI has two possible B channels. It is possible to order a line with one or both of the B channels enabled – and each may be enabled for voice and/or data use. Phone terminology for the class of service is CSV for Circuit Switched Voice and CSD for Circuit Switched Data. (In contrast to PSD, Packet Switched Data, which is possible but irrelevant to our needs.)

CSD is not required for Telos TWOx12 connections. Even though you are sending a stream of data, the phone network knows to translate this back to analog at the far end due to the call setup message sent on the D channel when the call is made. If this ISDN BRI circuit will also be used with an audio codec such as the Zephyr or ZephyrExpress, then CSD should be ordered as it is *required* for audio codec calls.

CSV is for interworking with voice phone service and allows ISDN to interwork with analog phone lines and phones.

You will be ordering one or more ISDN BRI 2B+D circuits with CSV (required) and CSD (optional) on each B channel. Euro ISDN normally provides both CSV and CSD which is acceptable.

NT1s

The ISDN standard specifies two reference points, the "U" and the "S" interfaces. The U is the single-pair bare copper from the Telco CO. A device called a "Network Termination, Type 1" converts this to the two-pair S interface.

In Europe, Asia, South America, and most of the world the NT1 is always provided by the phone company, and only the S interface may be on user equipment. If you plan on taking your TWOx12 to Canada or North America you will need to purchase an external NT1 for use while in those countries.

Hunt Groups

Just as with analog lines, ISDN BRI lines can be placed in a "hunt group" where a single number can be given to callers and the calls will "roll over" from busy channels to idle channels. This is sometimes referred to as ISG (incoming service grouping) or rollover lines. This would usually be a requirement for an on-air phone

system. You may choose to exclude 1 or 2 channels from the hunt group (ie the Hot line and the Warm line). Be sure to specify to your Telco how you expect this to work.

Line Deactivation

The Euro ISDN standard allows ISDN BRI lines to be deactivated by the Telecom when not in use. It is impossible to distinguish a deactivated line from a line which is defective and out of service. If your application is critical you may wish to request that the Telecom disable line deactivation.

FAXABLE ISDN ORDER FORMS

Following form may be used to place orders for ISDN lines. These should give the Telecom all of the information they need.

Complete the top portion of the form and send it to the Telco.

ISDN BRI LINE ORDERING INFORMATION
ETS 300 (not for use in USA & Canada)
Telos TWOx12

To: Telecom

Attention: _____

From: _____ Location for line: _____

Company: _____ Company: _____

Address: _____ Address: _____

City/State/Postal Code: _____ City/State/Postal Code: _____

Phone: _____ Phone: _____

Contact: _____ Contact: _____

Long distance carrier: _____ Number of BRI circuits required: _____

Date needed: _____ Termination date: _____

We request the above number of ISDN Basic Rate Interface (ISDN-2, BRI, SØ) circuits for use with the Telos TWOx12 digital telephone system. This device interfaces audio equipment to digital telephone services. It *requires* Circuit Switched Voice (CSV). We may also use this line for other equipment which makes calls using Circuit Switched Data (CSD) service.

TWO has an integral BRI terminal adapter which supports the ETS 300 (Net3) protocol.

We require a standard "S" (4-wire) interface on a *standard, eight-pin/4-conductor RJ45-style modular jack*, of which only the center four conductors will be used.

Hunt Groups (please give us the option specified below):

- Please place all MSNs for all BRI's in a single hunt group (ISG or rollover group) Or
- Please create a hunt group with all MSNs *except (Specify)* _____
- No Hunt groups

Line Deactivation (please provide the option specified below):

- Our application is critical and we need to ensure that lines are working at all times. Please set the switch parameter "Deactivation Allow" to "NO".
- We would prefer to know if lines are working at all times. Therefore we request that you set the parameter "Deactivation Allow" to "NO" if this is possible.
- Line deactivation is acceptable; Please provide your default setting for this parameter.

You may call the manufacturer of the TWO, Telos Systems, at +1 (216) 241-7225 for any additional required information about ISDN compatibility. Ask for Telos TWOx12 Customer Support.

2 ISDN BRI Ordering Guide for USA & Canada

This section applies to users in Canada & USA and is intended to help you when it comes time to order your ISDN lines. We assume you have read the description of ISDN in section 2.3 and are familiar with ISDN's basic concepts. If you have not read that section, doing so now will help you better understand the information that follows.

Because ISDN is still rather new, there is still some confusion about what it is and how to get it. If you know who to call and provide them with complete information, the ISDN ordering process can be simple and straightforward. This guide takes you through the process step-by-step. Telos Technical Support is available to answer any further questions you may have.

On one ISDN BRI circuit, there are three simultaneous bi-directional channels: two 64kbps "bearer" or "B" channels for the transmission of user information and one 16kbps "data" or "D" channel for call set-up and status communication. That is why this is sometimes called 2B+D service. You can use the B channels, but only the phone companies and equipment manufacturers can usually use the D channel. ISDN comes into your facility on two wires, just like plain old telephone service (POTS).

From the perspective of telephone network routing, each channel appears to be a separate line with its own number and independent dial-out capabilities. Since each has to be dialed or answered separately, they appear to be "lines" to users also. We refer to a B channel as a "line" on the TWOx12's menus and LEDs.

The TWOx12's internal ISDN interface (sometimes called by its generic name "Terminal Adapter") is used to connect to digital ISDN telephone lines. It easily adapts to the various types of service offered by the range of Central Office (CO) switches installed by telephone companies in the USA and Canada.

Ordering ISDN

Dealing with the Phone Company

As is often the case when broadcasters interface with phone people, the lines of communication on ISDN can get a little tangled.

The first order of business is to find someone who knows what ISDN is. While your usual account agent will be the normal entry point, you will may be talking to a number of phone people before you find one who understands your needs.

Some of the regional Bell companies offer a single point of contact number for switched digital services, while some telcos use "resellers". Note that in some cases the phone company will need to do a "loop qualification" (line loss test) before they can verify that ISDN will be available at your location.

Here are some contact numbers we use – if you have particularly positive or negative experiences with these offices, please let us know.

COMPANY	TELEPHONE NUMBER	WORLDWIDE WEB
Ameritech	800-TEAMDATA (800-832-6328)	www.ameritech.com
Bell Atlantic	800-570-ISDN (800-570-4736)	www.ba.com
(see below for former NYNEX regions) Residential 800-204-7332		
Bell Atlantic North	Call your account representative. If you do not know who s/he is, call;	
(former NYNEX)	800-GET-ISDN (800-438-4736)	www.nynex.com
Bell South	800-428-ISDN (800-428-4736)	www.bell.bellsouth.com
Cincinnati Bell	513-566-DATA (513-566-3282)	
GTE	800-GTE-4WCN (800-483-4926)	www.gte.com
Natco	800-775-6682 ext 288	
Nevada Bell	Small Business 702-333-4811 Large business 702-688-7100	
Pacific Bell	800-4PB-ISDN (800-472-4736)	www.pacbell.com
Rochester Tel	716-777-4501 or 1234	
SNET	800-430-4736	www.ntplx.net
Stentor (Canada)	800-578-4736 (Fax server, document 200 has a list of local numbers)	
	For questions or assistance call 403-945-8130	
Southwestern Bell	800-SWB-ISDN (800-792-4736)	www.sbc.com
US West	800-728-4949 (Fax server)	www.uswest.com
	small business 800-246-5226	
	For questions or assistance 206-447-4029	

Details, Details

In order to communicate accurately what it is you need, we think you should be familiar with the vocabulary used to describe ISDN. As with anything, for best results, it helps to know what you are talking about. For an in-depth glossary of terminology please check Telos' web site at <http://www.telos-systems.com> .

Protocols

In a perfect world, all ISDN terminal equipment would work with all ISDN lines, without regard for such arcana as 5ESS, DMS100, CSV/CSD, SPIDs, etc. Unfortunately, the ISDN "standard" has been evolving for the past years and has only recently begun to settle down.

At their central offices, the telephone companies use either AT&T/Lucent 5ESS, Northern Telecom DMS100, or Siemens EWSD switching equipment. While each will work with the TWOx12, there are some differences which need to be taken into account when lines are ordered and used. Each has a "protocol" – the language the user equipment and the telephone network use to converse (on the D channel) for setting up calls and the like.

There is a standard protocol which all switches may provide, called National ISDN 1 (NI-1). This protocol was standardized and specified by Bellcore, the technical lab jointly owned by the phone companies. However, both AT&T and Northern Telecom had versions of ISDN which predated the NI-1 standard and some switches have not been upgraded to the new format.

There is also a newer NI-2 standard, but it is designed to be compatible with NI-1 for all of the basic functions.

SPIDs

Service Profile Identification (SPID) numbers are required in all but one of the AT&T protocols. These numbers are given to the user by the phone company and *must be entered correctly* into the TWOx12 in order for the connection to function. SPIDs usually consist of the phone number plus a few prefix or suffix digits. There is frequent confusion between phone numbers and SPIDs, even among telco personnel. While the SPID frequently includes the corresponding phone number, this is not necessarily the case.

The intention of the SPID is to allow the Telco equipment to automatically adapt to various user requirements by sensing different SPIDs from each type or configuration of user terminal. None of this matters with our application, but we must enter the SPIDs nevertheless. BellSouth has proposed, and most of the other telephone companies have agreed to implement, a standardized SPID for new installations. As of this writing, it has been implemented by most telcos. The standard is area code+phone number+0101 (XXXYYYZZZZ0101).

Unless you are using the AT&T PTP protocol, your Telco service representative should give you one SPID for each B channel you order. *Don't let the phone company installer leave without providing you with the phone numbers of your B channels (called Directory Numbers, or DNs) and your SPIDs!*

Directory Number (DN)

These are simply your seven digit phone numbers as would be listed in your local telephone directory and will need to be entered into your TWOx12. Normally each ISDN BRI circuit will have two DNs and two SPIDs. Each DN corresponds to a given SPID and when you enter this information you must enter them to reflect this relationship. You may also hear of a Listed Directory Number or LDN. This is simply the primary number for lines in a hunt group (see below). The LDN need not be entered in the unit, unless it is also one of your DNs.

CSD and CSV

Recall that each ISDN BRI has two possible B channels. It is possible to order a line with one or both of the B channels enabled – and each may be enabled for voice and/or data use. Phone terminology for the class of service is CSV for Circuit Switched Voice and CSD for Circuit Switched Data. (In contrast to PSD, Packet Switched Data, which is possible but irrelevant to our needs.)

CSD is not required for Telos TWOx12 connections. Even though you are sending a stream of data, the phone network knows to translate this back to analog at the far end due to the call setup message sent on the D channel when the call is made. If this ISDN BRI circuit will also be used with an audio codec such as the Zephyr or ZephyrExpress, then CSD should be ordered as it is *required* for audio codec calls.

CSV is for interworking with voice phone service and allows ISDN to interwork with analog phone lines and phones.

You will be ordering one or more ISDN BRI 2B+D circuits with CSV (required) and CSD (optional) on each B channel.

NT1s

The ISDN standard specifies two reference points, the “U” and the “S” interfaces. The U is the single-pair bare copper from the Telco CO. A device called a “Network Termination, Type 1” converts this to the two-pair S interface.

In Europe, Asia, South America, and most of the world the NT1 is always provided by the phone company, and only the S interface may be on user equipment. Therefore Telos TWOx12s shipped outside the USA & Canada have the S interface only. In the USA & Canada the NT1 must be provided by the user, and is therefore built-in to the TWOx12’s ISDN terminal adapter. In this case the “U” (RJ-11) interface is present.

Terminals and Terminal Types

Any equipment connected to an ISDN line is a ‘terminal’ – whether phone, computer, or Hybrid. Point-to-point lines support one terminal, while multipoint lines can have up to eight in some applications.

“Terminal Type” is a parameter sometimes requested by the phone people. The appropriate value for the TWOx12 varies depending upon protocol and is included on the order forms.

IOC Capability Packages (provisioning package)

More and more telcos are using ISDN Ordering Code (IOC) capability packages for ISDN ordering (National ISDN protocol only). If your telephone company uses these you need only tell them you need IOC package “S” and an RJ-11 style jack. We still recommend that you fax them these forms as well.

Hunt Groups

Just as with analog lines, ISDN BRI lines can be placed in a “hunt group” where a single number can be given to callers and the calls will “roll over” from busy channels to idle channels. This is sometimes called ISG (incoming service grouping) or rollover lines. This would usually be a requirement for an on-air phone system. You may choose to exclude 1 or 2 channels from the hunt group (i.e. the Hot line and the Warm line). Be sure to specify to your Telco how you expect this to work.

FAXABLE ISDN ORDER FORMS

Following forms should be used to place orders for ISDN lines. 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 TWOx12 manual.

Complete the top portion of the form and send all three 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 BRI LINE ORDERING INFORMATION
USA & Canada
Telos TWOx12

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 BRI circuits required: _____

Date needed: _____ Termination date: _____

We request the above number of ISDN Basic Rate Interface (BRI) circuits for use with the Telos TWOx12 digital telephone system. This device interfaces audio equipment to digital telephone services. It *requires* Circuit Switched Voice (CSV). We may also use this line for other equipment which makes calls using Circuit Switched Data (CSD) service. Please advise us if there is a cost penalty for having both CSD and CSV.

*If you use IOC (ISDN Order Code) Capability Packages, please use **Capability Package 'S'** (unless otherwise specified by the user). If you do not use IOCs, use the information on the pages that follow.*

TWO has an integral BRI terminal adapter which supports these protocols (see details on following pages):

AT&T 5ESS: Custom Point-to-Point (5E4.2 or later), National ISDN-1

Northern Telecom DMS-100: Functional (PVC1), National ISDN-1 (PVC2)

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 switch. We will provide the NT1 and need a U interface with 2B1Q line coding on a *standard, six-pin/4-conductor RJ11-style modular jack (USOC SJA48)*, of which only the center two conductors will be used.

Hunt Groups (please give us the option specified below):

- Please place all Directory Numbers for all BRI's in a single hunt group Or
- Please create a hunt group with all Directory Numbers *except (Specify)* _____
- No Hunt groups

You may call the manufacturer of the TWO, Telos Systems, at +1 (216) 241-7225 for any additional required information about ISDN compatibility. Ask for Telos TWOx12 Customer Support.

PROTOCOL: National ISDN-1

From AT&T 5ESS, Northern Telecom DMS100, and Siemens EWSD.

If you use IOC Capability Packages, please use Capability Package 'S' *unless otherwise specified*.

CO Values

Line Type: National ISDN-1

Bearer Service: CSD/CSV on both channels (*CSV is required; CSD may be omitted if requested by user*)

TEI: One dynamic per number

Turn off features such as; packet mode data, multiple call appearances, Electronic Key Telephone Sets (EKTS), shared directory numbers, accept special type of number, intercom groups, network resource selector (modem pools), message waiting, hunting, interLata competition, etc.

NOTE for EWSD running NI-2: Switch must be programmed CLID=DN

Note for AT&T/Lucent 5ESS on loop extended lines: REX test must be disabled for this line using one of the following: ASDFI266 (Prohibit REX on BRI lines per office) or ASDFI267 (Prohibit REX on BRI lines per line)

Give us:

- 1) Two SPID numbers, depending upon number of active B channels
- 2) Two Directory Numbers

PROTOCOL: Northern Telecom DMS100 "Functional" (Custom, PVC1)

Northern Telecom DMS100 switches BCS 31 and above.

CO Values

Line Type: Basic Rate, Functional

EKTS: No

Call Appearance Handling: No

Non-Initializing Terminal: No

Circuit Switched Service: Yes

Packet Switched Service: No

TEI: Dynamic

Bearer Service: CSD/CSV on both channels (*CSV is required; CSD may be omitted if requested by user*)

Give us:

- 1) Two SPID numbers, depending upon number of active B channels
- 2) Two Directory Numbers

PROTOCOL: AT&T Point-to-Point (Custom)

Software version 5E4.2 and above.

CO Values:

Line Type (DSL class): Point-to-Point (PTP)

B1 Service: On Demand (DMD)

B2 Service: On Demand (DMD)

Maximum B Channels (MaxChan): 2

CSV Channels: Any

Number of CSV calls: 1

CSD Channels: Any (*CSV is required; CSD may be omitted if requested by user*)

Number of CSD calls: 2

Terminal Type: A

Number Display: No

Call Appearance Pref: Idle

1010XXX Long Distance Prefix: Yes

Turn off features such as; packet mode data, multiple call appearances, Electronic Key Telephone Sets (EKTS), shared directory numbers, accept special type of number, intercom groups, network resource selector (modem pools), message waiting, hunting, interLata competition, etc.

Note for AT&T/Lucent 5ESS on loop extended lines: REX test must be disabled for this line using one of the following: ASDFI266 (Prohibit REX on BRI lines per office) or ASDFI267 (Prohibit REX on BRI lines per line)

Give us:

- 1) One Directory Number

PROTOCOL: AT&T Point-to-Multipoint (Custom)

Not supported by the Telos TWO.

Please provide National ISDN or AT&T Point-to-Point (Custom)