11. Interface Groups, Transmission Specifications and Channel Code

11.1 Local Transport Interface Groups

Ten Interface Groups are provided for terminating the Local Transport Entrance Facility at the customer's premises. Each Interface Group provides a specified premises interface code (e.g., two-wire, four-wire, DS1, etc.). At the option of the customer and where transmission facilities permit, the Entrance Facility and individual transmission path between the customer's premises and the first point of switching may be provided with optional features as set forth in Section 6.2.1 (G) preceding.

As a result of the customer's access order and the type of Telephone Company transport facilities serving the customer's premises, the need for signaling conversions or two-wire to four-wire conversions, or the need to terminate digital or high frequency facilities in channel bank equipment may require that Telephone Company equipment be placed at the customer's premises. For example, if a voice frequency interface is ordered by the customer and the Telephone Company facilities serving the customers premises are digital, then Telephone Company channel bank equipment must be placed at the customer's premises in order to provide the voice frequency interface ordered by the customer.

Interface Group 1 is provided with Type C Transmission Specifications, and Interface Groups 2 through 10 are provided with Type A or B Transmission Specifications, depending on the Feature Group and whether the Access Service is routed directly or through a Telephone Company access tandem. All Interface Groups are provided with Data Transmission Parameters. (S)(X)(Y) (S)(X)(Y)

Only certain premises interfaces are available at the customer's premises. The premises interfaces codes associated with the Interface Groups may vary among Feature Groups. The various premises interfaces codes which are available with the Interface Groups, and the Feature Groups with which they may be used, are set forth in 11.1.11 following.

(X) Effective date of material deferred from November 10, 1994 to December 1, 1994 by Special Permission No. 94-1269.

(Y) Effective date of material deferred from December 1, 1994 to January 24, 1995 by Special Permission No. 94-1315.

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.1 Local Transport Interface Groups (Cont'd)

For each of the ten Interface Groups described following, the transmission path between the point of termination at the customer's premises and the first point of switching may be comprised of any form or configuration of plant and equipment capable of and typically used in the telecommunications industry for the transmission of voice and associated telephone signals within the frequency bandwidth of 300 to 3000 Hz.

11.1.1 Interface Group 1 (USOC TPPIX)

Interface Group 1 provides a two-wire voice frequency transmission path at the point of termination at the customer's premises. Interface Group 1 is not provided in association with FGC and FGD when the first point of switching is a Telephone Company access tandem. In addition, Interface Group 1 is not provided in association with FGB, FGC or FGD when the first point of switching can only provide four-wire terminations. (S)(X)(Y)

Interface Group 1 is not provided in association with FGC and FGD when the first point of switching is a Telephone Company access tandem. In addition, Interface Group 1 is not provided in association with FGB, FGC, or FGD when the first point of switching provides only four-wire terminations. (S)(X)(Y)

The interface is provided with loop supervisory signaling. When the interface is associated with FGA, such signaling will be loop start or ground start signaling. When the interface is associated with FGB, FGC, or FGD, such signaling will be

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(Y) Effective date of material deferred from December 1, 1994 to January 24, 1995 by Special Permission No. 94-1315.

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.1 Local Transport Interface Groups (Cont'd)

11.1.1 Interface Group 1 (USOC TPPIX) (Cont'd)

reverse battery signaling. When FGB, FGC, or FGD access service is associated with a two-way calling interface, E&M signaling shall be used.

11.1.2 Interface Group 2 (USOC TTP2X)

Interface Group 2 provides four-wire voice frequency transmission at the point of termination at the customer's premises. The interface is provided with loop supervisory signaling. When the interface is associated with FGA, such signaling will be loop start or ground start signaling. When the interface is associated with FGB, FGC, or FGD, such signaling, except for two-way calling which is E&M signaling, will be reverse battery signaling.

The transmission path between the point of termination at the customer designated premises and the first point of switching may be comprised of any form or configuration of plant capable of, and typically used in the telecommunications industry for the transmission of voice, and associated telephone signals within the frequency bandwidth of approximately 300 to 3000 Hz.

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.1 Local Transport Interface Groups (Cont'd)

11.1.3 Interface Group 3 (USOC TPP3X)

Interface Group 3 provides group level analog transmission at the point of termination at the customer's premises. The interface is capable of transmitting electrical signals between the frequencies of 60 to 180 kHz, with the capability to channelize up to 12 voice frequency transmission paths. Certain frequencies within the bandwidth of the Interface Group are reserved for Telephone Company use, e.g., pilot and carrier group alarm tones. Before the first point of switching, the Telephone Company will provide multiplex
equipment to derive 12 transmission paths with a frequency bandwidth of approximately 300 to 3000 Hz.

The interface is provided with SF supervisory signaling for each individual transmission channel.

As of December 1, 1993, Interface Group 3 is available to existing customers only.

11.1.4 Interface Group 4 (USOC TPP4X)

Interface Group 4 provides supergroup level analog transmission at the point of termination at the customer's premises. The interface is capable of transmitting electrical signals between the frequencies of 312 to 552 kHz, with the capability to channelize up to 60 voice frequency transmission paths. Certain frequencies within the bandwidth of the Interface Group are reserved for Telephone Company use, e.g., pilot and carrier group alarm tones. Before the first point of switching, the Telephone Company will provide multiplex

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.1 Local Transport Interface Groups (Cont'd)

11.1.4 Interface Group 4 (USOC TPP4X) (Cont'd)

and channel bank equipment to derive 60 transmission paths with a frequency bandwidth of approximately 300 to 3000 Hz.

The interface is provided with SF supervisory signaling for each individual transmission channel.

As of December 1, 1993, Interface Group 4 is available to existing customers only.

11.1.5 Interface Group 5 (USOC TPP5X)

Interface Group 5 provides mastergroup level analog transmission at the point of termination at the customer's premises. The interface is capable of transmitting electrical signals between the frequencies of 564 to 3084 kHz, with the capability to channelize up to 600 voice frequency transmission paths. Certain frequencies within the bandwidth of the Interface Group are reserved for Telephone Company use, e.g., pilot and carrier group alarm tones. Before the first point of switching, the Telephone Company will provide multiplex and channel bank equipment to derive 600 transmission paths with a frequency bandwidth of approximately 300 to 3000 Hz.

The interface is provided with SF supervisory signaling for each individual transmission channel.

1. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.1 Local Transport Interface Groups (Cont'd)

11.1.5 Interface Group 5 (USOC TPP5X) (Cont'd)

As of December 1, 1993, Interface Group 5 is available to existing customers only.

11.1.6 Interface Group 6 (USOC TPP6X)

Interface Group 6 provides DS1 level digital transmission at the point of termination at the customer's premises. The interface is capable of transmitting electrical signals at a nominal 1.544 Mbps, with the capability to channelize up to 24 voice frequency transmission paths. Before the first point of switching, when analog switching utilizing analog terminations is provided, the Telephone Company will provide multiplex and channel bank equipment to derive 24 transmission paths with a frequency bandwidth of approximately 300 to 3000 Hz. When digital switching or analog switching with digital carrier terminations is provided, the Telephone Company will provide, at the first point of switching, a DS1 signal in D3/D4 format.

The interface is provided with bit stream supervisory signaling for each individual transmission channel.

11.1.7 Interface Group 7 (USOC TPP7X)

Interface Group 7 provides DS1C level digital transmission at the point of termination at the customer's premises. The interface is capable of transmitting electrical signals at a

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.1 Local Transport Interface Groups (Cont'd)

11.1.7 Interface Group 7 (USOC TPP7X) (Cont'd)

nominal 3.152 Mbps, with the capability to channelize up to 48 voice frequency transmission paths. Before the first point of switching, when analog switching utilizing analog terminations is provided, the Telephone Company will provide multiplex and channel bank equipment to derive up to 48 voice frequency transmission paths with a frequency bandwidth of approximately 300 to 3000 Hz. When digital switching or analog switching with digital carrier terminations
is provided, the Telephone Company will provide, at the first point of switching, DS1 signals in D3/D4 format.

The interface is provided with bit stream supervisory signaling for each individual transmission channel.

As of December 1, 1993, Interface Group 7 is available to existing customers only.

11.1.8 Interface Group 8 (USOC TPP8X)

Interface Group 8 provides DS2 level digital transmission at the point of termination at the customer's premises. The interface is capable of transmitting electrical signals at a nominal 6.312 Mbps, with the capability to channelize up to 96 voice frequency transmission paths. Before the first point of switching, when analog switching utilizing analog terminations is provided, the Telephone Company will provide multiplex and channel bank equipment in its office to derive up

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.1 Local Transport Interface Groups (Cont'd)

11.1.8 Interface Group 8 (USOC TPP8X) (Cont'd)

to 96 transmission paths with a frequency bandwidth of approximately 300 to 3000 Hz. When digital switching, or analog switching with digital carrier terminations is provided, the Telephone Company will provide, at the first point of switching, DS1 signals in D3/D4 format.

The interface is provided with bit stream supervisory signaling for each individual transmission channel.

Interface Group 8 is provided on an Individual Case Basis.

11.1.9 Interface Group 9 (USOC TPP9X)

Interface Group 9 provides DS3 level digital transmission at the point of termination at the customer's premises. The interface is capable of transmitting electrical signals at a nominal 44.736 Mbps, with the capability to channelize up to 672 voice frequency transmission paths. Before the first point of switching, when analog switching utilizing analog terminations is provided, the Telephone Company will provide multiplex and channel bank equipment to derive up to 672 transmission paths with a frequency bandwidth of approximately 300 to 3000 Hz. When digital switching, or analog switching with digital carrier terminations is provided, the Telephone Company will provide, at the first point of switching, DS1 signals in D3/D4 format.

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.1 Local Transport Interface Groups (Cont'd)

11.1.9 Interface Group 9 (USOC TPP9X) (Cont'd)

The interface is provided with bit stream supervisory signaling for each individual transmission channel.

11.1.10 Interface Group 10 (USOC TPPAX)

Interface Group 10 provides DS4 level digital transmission at the point of termination at the customer's premises. The interface is capable of transmitting electrical signals at a nominal 274.176 Mbps, with the capability to channelize up to 4032 voice frequency transmission paths. Before the first point of switching, when analog switching utilizing analog terminations is provided, the Telephone Company will provide multiplex and channel bank equipment to derive up to 4032 transmission paths with a frequency bandwidth of approximately 300 to 3000 Hz. When digital switching or analog switching with digital carrier terminations is provided, the Telephone Company will provide, at the first point of switching, DS1 signals in D3/D4 format.

The interface is provide with bit stream supervisory signaling for each individual transmission channel.

Interface Group 10 is provided on an Individual Case Basis.

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.1 Local Transport Interface Groups (Cont'd)

11.1.11 Available Premises Interface Codes

Following is a matrix showing which premises interface codes are available for each Interface Group as a function of the Telephone Company switch supervisory signaling and Feature Group. For explanations of these codes, see the Glossary of Channel Interface Codes in 11.3.1 following.

Interface Group	Telephone Company Switch Supervisory Signaling	Premises Interface Code	Feature Group A	B	C	D
1	LO	2LS2	X			
	LO	2LS3	X			
	GO	2GS2	X			
	GO	2GS3	X			
	LO, GO	2DX3	X			
	LO, GO	4EA3-E	X			
	LO, GO	4EA3-M	X			
	LO, GO	6EB3-E	X			
	LO, GO	6EB3-M	X			
	RV, EA, EB, EC	2DX3		X	X	X
	RV, EA, EB, EC	4EA3-E		X	X	X
	RV, EA, EB, EC	4EA3-M		X	X	X
	RV, EA, EB, EC	6EB3-E		X	X	X
	RV, EA, EB, EC	6EB3-M		X	X	X
	EA, EB, EC	6EC3			X	X
	RV	2RV3-0		X	X	X
	RV	2RV3-T		X	X	X
2	LO, GO	4SF2	X			
	LO, GO	4SF3	X			
	LO	4LS2	X			
	LO	4LS3	X			

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.1 Local Transport Interface Groups (Cont'd)

11.1.11 Available Premises Interface Codes (Cont'd)

Interface Group	Telephone Company Switch Supervisory Signaling	Premises Interface Code	Feature Group A	B	C	D
2(Cont'd)	LO	6LS2	X			
	GO	4GS2	X			
	GO	4GS3	X			
	GO	6GS2	X			
	LO, GO	4DX2	X			
	LO, GO	4DX3	X			
	LO, GO	6EA2-E	X			
	LO, GO	6EA2-M	X			
	LO, GO	8EB2-E	X			
	LO, GO	8EB2-M	X			
	LO, GO	6EX2-B	X			
	RV, EA, EB, EC	4SF2		X	X	X
	RV, EA, EB, EC	4SF3		X		
	RV, EA, EB, EC	4DX2		X	X	X
	RV, EA, EB, EC	4DX3		X	X	X
	RV, EA, EB, EC	6DX2			X	
	RV, EA, EB, EC	6EA2-E		X	X	X
	RV, EA, EB, EC	6EA2-M		X	X	X
	RV, EA, EB, EC	8EB2-E		X	X	X
	RV, EA, EB, EC	8EB2-M		X	X	X
	EA, EB, EC	8EC2-M			X	X
	RV	4RV2-0		X	X	X
	RV	4RV2-T		X	X	X
	RV	4RV3-0		X	X	
	RV	4RV3-T		X	X	
3	LO, GO	4AH5-B	X			
	RV, EA, EB, EC	4AH5-B		X	X	X

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.1 Local Transport Interface Groups (Cont'd)

11.1.11 Available Premises Interface Codes (Cont'd)

Interface Group	Telephone Company Switch Supervisory Signaling	Premises Interface Code	Feature Group A	B	C	D
4	LO, GO	4AH6-C	X			
	RV, EA, EB, EC	4AH6-C		X	X	X
5	LO, GO	4AH6-D	X			
	RV, EA, EB, EC	4AH6-D		X	X	X
6	LO, GO	4DS9-15	X			
	LO, GO	4DS9-15L	X			
	RV, EA, EB, EC	4DS9-15		X	X	X
	RV, EA, EB, EC	4DS9-15L		X	X	X
7	LO, GO	4DS9-31	X			
	RV, EA, EB, EC	4DS9-32		X	X	X
	LO, GO	4DS9-31L	X			
	RV, EA, EB, EC	4DS9-31L		X	X	X
8	LO, GO	4DSO-63	X			
	LO, GO	4DSO-63L	X			
	RV, EA, EB, EC	4DSO-63		X	X	X
	RV, EA, EB, EC	4DSO-63L		X	X	X
9	LO, GO	4DS6-44	X			
	LO, GO	4DS6-44L	X			
	RV, EA, EB, EC	4DS6-44		X	X	X
	RV, EA, EB, EC	4DS6-44L		X	X	X

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.1 Local Transport Interface Groups (Cont'd)

11.1.11 Available Premises Interface Codes (Cont'd)

Interface Group	Telephone Company Switch Supervisory Signaling	Premises Interface Code	Feature Group A	B	C	D
10	LO, GO	4DS6-27	X			
	LO, GO	4DS6-27L	X			
	RV, EA, EB, EC	4DS6-27		X	X	X
	RV, EA, EB, EC	4DS6-27L		X	X	X

11.1.12 Supervisory Signaling

Supervisory Signaling allows the customer to order an optional supervisory signaling arrangement for each transmission path provided where the transmission parameters permit, and where signaling conversion is required by the customer to meet its signaling capability.

- For Interface Groups 1 and 2

  DX Supervisory Signaling,
  E&M Type I Supervisory Signaling,
  E&M Type II Supervisory Signaling, or
  E&M Type III Supervisory Signaling

- For Interface Group 2

  SF Supervisory Signaling, or
  Tandem Supervisory Signaling

These Interface Groups may, at the option of the customer be provided with individual transmission path SF supervisory

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.1 Local Transport Interface Groups (Cont'd)

11.1.12 Supervisory Signaling (Cont'd)

signaling where such signaling is available in Telephone Company central offices. Generally such signaling is available only where the entry switch provides an analog, i.e., nondigital, interface to the transport termination.

11.2 Transmission Specifications Switched Access Service

11.2.1 Standard Transmission Specifications

The Telephone Company will maintain existing transmission specifications on functioning service configurations installed prior to the effective date of this tariff except that service configurations having performance specifications exceeding the standards listed in this provision will be maintained at performance levels specified in this tariff.

The transmission specifications contained in this Section are immediate action limits. Acceptance limits are set forth in Technical Reference TR-NPL-000334. This Technical Reference also provides the basis for determining Switched Access Service maintenance limits.

(A) Type A Transmission Specifications

Type A Transmission Specifications are provided with the following parameters:

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.2 Transmission Specifications Switched Access Service (Cont'd)

11.2.1 Standard Transmission Specifications (Cont'd)

(A) Type A Transmission Specifications (Cont'd)

(1) Loss Deviation

The maximum Loss Deviation of the 1004 Hz loss relative to the Expected Measured Loss (EML) is ±2.0 dB.

(2) Attenuation Distortion

The maximum Attenuation Distortion in the 404 to 2804 Hz frequency band relative to the loss at 1004 Hz is -1.0 dB to +3.0 dB.

(3) C-Message Noise

The maximum C-Message Noise for the transmission path at the route miles listed is less than or equal to:

Route Miles	C-Message Noise
Less than 50	32 dBrnCO
51 to 100	34 dBrnCO
101 to 200	37 dBrnCO
201 to 400	40 dBrnCO
401 to 1000	42 dBrnCO

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.2 Transmission Specifications Switched Access Service (Cont'd)

11.2.1 Standard Transmission Specifications (Cont'd)

(A) Type A Transmission Specifications (Cont'd)

(4) C-Notch Noise

The maximum C-Notch Noise, utilizing a -16 dBmO holding tone, is less than or equal to 45 dBrnCO.

(5) Echo Control

Echo Control, identified as Equal Level Echo Path Loss, and expressed as Echo Return Loss and Singing Return Loss, is dependent on the routing, i.e., whether the service is routed directly from the customer's point of termination (POT) to the end office or via a Telephone Company access tandem. It is equal to or greater than the following: (S)(X)(Y)

	Echo Return Loss	Singing Return Loss
POT to Access Tandem	21 dB	14 dB
POT to End Office		
- Direct	N/A	N/A
- Via Access Tandem	16 dB	11 dB

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(Y) Effective date of material deferred from December 1, 1994 to January 24, 1995 by Special Permission No. 94-1315.

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.2 Transmission Specifications Switched Access Service (Cont'd)

11.2.1 Standard Transmission Specifications (Cont'd)

(A) Type A Transmission Specifications (Cont'd)

(6) Standard Return Loss

Standard Return Loss expressed as Echo Return Loss and Singing Return Loss on two-wire (2) ports of a four-wire (4) point of termination shall be equal to or greater than:

Echo Return Loss	Singing Return Loss
5 dB	2.5 dB

(B) Type B Transmission Specifications

Type B Transmission Specifications are provided with the following parameters:

(1) Loss Deviation

The maximum Loss Deviation of the 1004 Hz loss relative to the Expected Measured Loss (EML) is plus or minus 2.5 dB.

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.2 Transmission Specifications Switched Access Service (Cont'd)

11.2.1 Standard Transmission Specifications (Cont'd)

(B) Type B Transmission Specifications (Cont'd)

(2) Attenuation Distortion

The maximum Attenuation Distortion in the 404 to 2804 Hz frequency band relative to loss at 1004 Hz is -2.0 dB to +4.0 dB.

(3) C-Message Noise

The maximum C-Message Noise for the transmission path at the route miles listed is less than or equal to:

	C-Message Noise*	
Route Miles	Type B1	Type B2
Less than 50	32 dBrnCO	35 dBrnCO
51 to 100	33 dBrnCO	37 dBrnCO
101 to 200	35 dBrnCO	40 dBrnCO
201 to 400	37 dBrnCO	43 dBrnCO
401 to 1000	39 dBrnCO	45 dBrnCO

* For Feature Groups C and D only Type B2 will be provided. For Feature Groups A and B, Type B1 or B2 will be provided as set forth in Technical Reference TR-NPL-000334.

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.2 Transmission Specifications Switched Access Service (Cont'd)

11.2.1 Standard Transmission Specifications (Cont'd)

(B) Type B Transmission Specifications (Cont'd)

(4) C-Notch Noise

The maximum C-Notch Noise, utilizing a -16 dBm0 holding tone is less than or equal to 47 dBrnCO.

(5) Echo Control

Echo Control, identified as Impedance Balance for FGA and FGB and Equal Level Echo Path Loss for FGC and FGD, and expressed as Echo Return Loss (ERL) and Singing Return Loss (SRL), is dependent on the routing, i.e., whether the service is routed directly from the customer's point of termination (POT) to the end office or via a Telephone Company access tandem. The ERL and SRL also differ by Switched Access Service, type of termination, and type of transmission path. They are greater than or equal to the following: (S)(X)(Y)

	Echo Return Loss	Singing Return Loss
POT to Access Tandem		
- Terminated in Four-wire (4) trunk	21 dB	14 dB
- Terminated in Two-wire (2) trunk	16 dB	11 dB

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11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.2 Transmission Specifications Switched Access Service (Cont'd)

11.2.1 Standard Transmission Specifications (Cont'd)

(B) Type B Transmission Specifications (Cont'd)

(5) Echo Control (Cont'd)

	Echo Return Loss	Singing Return Loss
POT to End Office		
- Direct	16 dB	11 dB
- Via Access Tandem		
. For FGB access	8 dB	4 dB
. For FGC access (effective four-wire (4) transmission path at end office)	16 dB	11 dB
. For FGC access (effective two-wire (2) transmission path at end office)	13 dB	6 dB

(6) Standard Return Loss

Standard Return Loss, expressed as Echo Return Loss and Singing Return Loss, on two-wire (2) ports of a four-wire (4) point of termination shall be equal to or greater than:

Echo Return Loss	Singing Return Loss
5 dB	2.5 dB

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.2 Transmission Specifications Switched Access Service (Cont'd)

11.2.1 Standard Transmission Specifications (Cont'd)

(C) Type C Transmission Specifications

Type C Transmission Specifications are provided with the following parameters:

(1) Loss Deviation

The maximum Loss Deviation of the 1004 Hz loss relative to the Expected Measured Loss (EML) is plus or minus 3.0 dB.

(2) Attenuation Distortion

The maximum Attenuation Distortion in the 404 to 2804 Hz frequency band relative to loss at 1004 Hz is -2.0 dB to +5.5 dB.

(3) C-Message Noise

The maximum C-Message Noise for the transmission path at the route miles listed is less than or equal to:

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.2 Transmission Specifications Switched Access Service (Cont'd)

11.2.1 Standard Transmission Specifications (Cont'd)

(C) Type C Transmission Specifications (Cont'd)

(3) C-Message Noise (Cont'd)

	C-Message Noise*	
Route Miles	Type B1	Type B2
Less than 50	32 dBrnCO	38 dBrnCO
51 to 100	33 dBrnCO	39 dBrnCO
101 to 200	35 dBrnCO	41 dBrnCO
201 to 400	37 dBrnCO	43 dBrnCO
401 to 1000	39 dBrnCO	45 dBrnCO

(4) C-Notch Noise

The maximum C-Notch Noise, utilizing a -16 dBmO holding tone is less than or equal to 47 dBrnCO.

(5) Echo Control

Echo Control, identified as Return Loss and expressed as Echo Return Loss and Singing Return Loss is dependent on the routing, i.e., whether the

* For Feature Groups C and D only Type C2 will be provided. For Feature Groups A and B, Type C1 or C2 will be provided set forth in Technical Reference TR-NPL-000334.

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.2 Transmission Specifications Switched Access Service (Cont'd)

11.2.1 Standard Transmission Specifications (Cont'd)

(C) Type C Transmission Specifications (Cont'd)

(5) Echo Control (Cont'd)

service is routed directly from the customer's point of termination (POT) to the end office or via a Telephone Company access tandem. It is equal to or greater than the following: (S)(X)(Y)

	Echo Return Loss	Singing Return Loss
POT to Access Tandem	13 dB	6 dB
POT to End Office		
- Direct	13 dB	6 dB
- Via Access Tandem (for FGB only)	8 dB	4 dB

11.2.2 Data Transmission Parameters

Two types of Data Transmission Parameters, i.e., Type DA and Type DB, are provided for the Switched Access Service arrangements. The specific applications in terms of the Feature Groups with which they are provided are set forth in Section 6.3 preceding. In addition, the Combined Access Service Arrangement is provided with Data Transmission Parameters. Following are descriptions of each parameter.

(X) Effective date of material deferred from November 10, 1994 to December 1, 1994 by Special Permission No. 94-1269.

(Y) Effective date of material deferred from December 1, 1994 to January 24, 1995 by Special Permission No. 94-1315.

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.2 Transmission Specifications Switched Access Service (Cont'd)

11.2.2 Data Transmission Parameters (Cont'd)

(A) Data Transmission Parameters Type DA

(1) Signal to C-Notched Noise Ratio

The Signal to C-Notched Noise Ratio is equal to or greater than 33 dB.

(2) Envelope Delay Distortion

The maximum Envelope Delay Distortion for the frequency bands and route miles specified is:

604 to 2804 Hz

Less than 50 route miles	500 microseconds
Equal to or greater than 50 route miles	900 microseconds

1004 to 2404 Hz

Less than 50 route miles	200 microseconds
Equal to or greater than 50 route miles	400 microseconds

(3) Impulse Noise Counts

The Impulse Noise Counts exceeding a 65 dBrnCO threshold in 15 minutes is no more than 15 counts.

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.2 Transmission Specifications Switched Access Service (Cont'd)

11.2.2 Data Transmission Parameters (Cont'd)

(A) Data Transmission Parameters Type DA (Cont'd)

(4) Intermodulation Distortion

The Second Order (R2) and Third Order (R3) Intermodulation Distortion products are equal to or greater than:

Second Order (R2)	33 dB
Third Order (R3)	40 dB

(5) Phase Jitter

The Phase Jitter over the 4-300 Hz frequency band is less than or equal to 5 degrees peak-to-peak.

(6) Frequency Shift

The maximum Frequency Shift does not exceed -2 to +2 Hz.

(B) Data Transmission Parameters Type DB

(1) Signal to C-Notched Noise Ratio

The signal to C-Notched Noise Ratio is equal to or greater than 30 dB.

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.2 Transmission Specifications Switched Access Service (Cont'd)

11.2.2 Data Transmission Parameters (Cont'd)

(B) Data Transmission Parameters Type DB (Cont'd)

(2) Envelope Delay Distortion

The maximum Envelope Delay Distortion for the frequency bands and route miles specified is:

604 to 2804 Hz

Less than 50 route miles	800 microseconds
Equal to or greater than 50 route miles	1000 microseconds

1004 to 2404 Hz

Less than 50 route miles	320 microseconds
Equal to or greater than 50 route miles	500 microseconds

(3) Impulse Noise Counts

The Impulse Noise Counts exceeding a 67 dBrnCO threshold in 15 minutes is no more than 15 counts.

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.2 Transmission Specifications Switched Access Service (Cont'd)

11.2.2 Data Transmission Parameters (Cont'd)

(B) Data Transmission Parameters Type DB (Cont'd)

(4) Intermodulation Distortion

The Second Order (R2) and Third Order (R3) Intermodulation Distortion products are equal to or greater than:

Second Order (R2)	31 dB
Third Order (R3)	34 dB

(5) Phase Jitter

The Phase Jitter over the 4-300 Hz frequency band is less than or equal to 7 degrees peak-to-peak.

(6) Frequency Shift

The maximum Frequency shift does not exceed -2 to +2 Hz.

11.3 Special Access Channel Interface and Network Channel Codes

This section explains the Channel Interface codes and Network Channel codes that the customer must specify when ordering Special Access Service, Switched Access Entrance Facilities, and Voice Grade and High Capacity Direct Trunked Transport. Included is an example which explains the specific characters of the code, a glossary of Channel Interface codes, impedance levels, Network Channel codes and compatible Channel Interfaces.

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

Example: If the customer specifies an NT Network Channel Code and a 2DC8-3 Channel Interface at the customer's premises, the following is being requested:

NT	=	Metallic Channel with a Predefined Technical Specification Package (1)
2	=	Number of physical wires at customer premises
DC	=	Facility interface for direct current or voltage
8	=	Variable impedance level
3	=	Metallic facilities (DC continuity) for direct current/low frequency control signals or slow speed data (30 baud)

11.3.1 Glossary of Channel Interface Codes and Options

Code	Option	Definition
AB -		Accepts 20 Hz ringing signal at customer's point of termination
AC -		Accepts 20 Hz ringing signal at customer's end user's point of termination
AH -		Analog high capacity interface
-	B	60 kHz to 108 kHz (12 Channels)
-	C	312 kHz to 552 kHz (60 channels)
-	D	564 kHz to 3084 kHz (600 channels)
CT -		Centrex Tie Trunk Termination
DA -		Data stream in VF frequency band at customer's end user's point of termination

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.1 Glossary of Channel Interface Codes and Options (Cont'd)

Code	Option	Definition
DB -		Data stream in VF frequency band at customer's point of termination
-	10	VF for TG1 and TG2
-	43	VF for 43 Telegraph Carrier type signals, TG1 and TG2 DC - direct current or voltage
-	1	Monitoring interface with series RC combination (McCulloh format)
-	2	Telephone Company energized alarm channel
-	3	Metallic facilities (DC continuity) for direct current/low frequency control signals or slow speed data (30 baud)
DD -		DATAPHONE Select-A-Station (and TABS) interface at customer's point of termination
DE -		DATAPHONE Select-A-Station (and TABS) interface at the customer's end user's point of termination
DS -		Digital hierarchy interface
-	15	1.544 Mbps (DS1) format per PUB 41451 plus D4
-	15E	8-bit PCM encoded in one 64 kbps of the DS1 signal
-	15F	8-bit PCM encoded in two 64 kbps of the DS1 signal
-	15G	8-bit PCM encoded in three 64 kbps of the DS1 signal
-	15H	14/11-bit PCM encoded in six 64 kbps of the DS1 signal
-	15J	1.544 Mbps format per PUB 41451
-	15K	1.544 Mbps format per PUB 41451 plus extended framing format

11. Interface Groups, Transmission Specifications and Channel Codes (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.1 Glossary of Channel Interface Codes and Options (Cont'd)

Code	Option	Definition
DS (Cont'd)		
-	15L	1.544 Mbps (DS1) with SF signaling
-	27	274.176 Mbps (DS4)
-	27L	274.176 Mbps (DS4) with SF signaling
-	31	3.152 Mbps (DS1C)
-	31L	3.152 Mbps (DS1C) with SF signaling
-	44	44.736 Mbps (DS3)
-	44L	44.736 Mbps (DS3) with SF signaling
-	63	6.312 Mbps (DS2)
-	63L	6.312 Mbps (DS2) with SF signaling
DU -		Digital access interface
-	19	19.2 kbps
-	24	2.4 kbps
-	48	4.8 kbps
-	56	56.0 kbps
-	64	64 kbps
-	96	9.6 kbps
-	A	1.544 Mbps format per PUB 41451
-	B	1.544 Mbps format per PUB 41451 plus D4
-	C	1.544 Mbps format per PUB 41451 plus extended framing format
DX -		Duplex signaling interface at customer's point of termination
DY -		Duplex signaling interface at customer's end user's point of termination

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.1 Glossary of Channel Interface Codes and Options (Cont'd)

Code	Option	Definition
EA -	E	Type I E&M Lead Signaling. Customer at POT or customer's end user at POT originates on E Lead.
EA -	M	Type I E&M Lead Signaling. Customer at POT or customer's end user at POT originates on M Lead.
EB -	E	Type II E&M Lead Signaling. Customer at POT or customer's end user at POT originates on E Lead.
EB -	M	Type II E&M Lead Signaling. Customer at POT or customer's end user at POT originates on M Lead.
EC -		Type III E&M signaling at customer POT
EX -	A	Tandem channel unit signaling for loop start or ground start and customer supplies open end (dial tone, etc.) functions.
EX -	B	Tandem channel unit signaling for loop start or ground start and customer supplies closed end (dial pulsing, etc.) functions.
GO -		Ground start loop signaling - open end function by customer or customer's end user.
GS -		Ground start loop signaling - closed end function by customer or customer's end user.
IA -		E.I.A. (25 pin RS-232)

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.1 Glossary of Channel Interface Codes and Options (Cont'd)

Code	Option	Definition
LA -		End user loop start loop signaling - Type A OPS registered port open end
LB -		End user loop start loop signaling - Type B OPS registered port open end
LC -		End user loop start loop signaling - Type C OPS registered port open end
LO -		Loop start loop signaling - open end function by customer or customer's end user
LR -		20 Hz automatic ringdown interface at customer with Telephone Company provided PLAR
LS -		Loop start loop signaling - closed end function by customer or customer's end user
NO -		No signaling interface, transmission only
PG -		Program transmission - no dc signaling
-	1	Nominal frequency from 50 to 15000 Hz
-	3	Nominal frequency from 200 to 3500 Hz
-	5	Nominal frequency from 100 to 5000 Hz
-	8	Nominal frequency from 50 to 8000 Hz

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.1 Glossary of Channel Interface Codes and Options (Cont'd)

Code	Option	Definition
PR -		Protective relaying*
RV -	0	Reverse battery signaling, one way operation, originate by customer
-	T	Reverse battery signaling, one way operation, terminate function by customer or customer's end user
SF -		Signal frequency signaling with VF band at either customer POT or customer's end user POT.
TF -		Telephotograph interface
TT -		Telegraph/Teletypewriter interface at either customer POT or customer's end user POT
-	2	20.0 milliamperes
-	3	3.0 milliamperes
-	6	62.5 milliamperes
TV -		Television interface
-	1	Combined (duplexed) video and one audio signal
-	2	Combined (duplexed) video and two audio signals
-	5	Video plus one (or two) audio 5 kHz signal(s) or one (or two) two-wire.

* Available only for the transmission of audio tone protective relaying signals used in the protection of electric power systems during fault conditions.

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.1 Glossary of Channel Interface Codes and Options (Cont'd)

Code	Option	Definition
TV (Cont'd)		
-	15	Video plus one (or two) audio 15 kHz signal(s)
WA -		Wideband bandwidth interface at customer's end user POT
-	1	Limited bandwidth
-	2	Nominal passband from 29000 to 44000 Hz
WB -		Wideband data interface at customer POT
-	18S	18.75 kbps, synchronous
-	19A	Up to 19.2 kbps asynchronous
-	19S	19.2 kbps synchronous
-	23A	Up to 230.4 kbps, asynchronous
-	23S	230.4 kbps, synchronous
-	40S	40.8 kbps, synchronous
-	50A	Up to 50.0 kpbs, asynchronous
-	50S	50.0 kbps synchronous
WC -		Wideband data interface at customer's end user
-	18	POT 18.75 kbps, synchronous
-	19	For 12-wire interface: 19.2 kbps, synchronous for 10-wire interface: up to 19.2 kbps
-	23	Asynchronous up to 230.4 kbps, asynchronous
-	23S	230.4 kbps, synchronous
-	40	40.8 kbps, synchronous
-	50	For 12-wire interface: 50.0 kbps, synchronous for 10-wire interface: up to 50.0 kbps

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.1 Glossary of Channel Interface Codes and Options (Cont'd)

Code	Option	Definition
WD -		Asynchronous wideband bandwidth interface at customer POT
-	1	Nominal passband from 300 to 18000 Hz
-	2	Nominal passband from 28000 to 44000 Hz
-	3	Nominal passband from 29000 to 44000 Hz

11.3.2 Impedance

The nominal reference impedance with which the channel will be terminated for the purpose of evaluating transmission performance:

Value (ohms)	Code(s)
110	0
150	1
600	2
900	3*
135	5
75	6
124	7
Variable	8
100	9

* For those interface codes with a four-wire (4) transmission path at the customer designated POT, rather than a standard 900 ohm impedance the code (3) denotes a customer provided transmission equipment termination. Such terminations were provided to customers in accordance with the FCC Docket No. 20099 Settlement Agreement.

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.3 Digital Hierarchy Channel Interface Codes (4DS)

Customers selecting the multiplexed four-wire DSX-1 or higher facility interface option at the customer designated premises will be requested to provide subsequent system and channel assignment data. The various digital bit rates in the digital hierarchy employ the channel interface code 4DS8, 4DS9, 4DS0, or 4DS6 plus the speed options indicated below:

Interface Code and Speed Option	Nominal Bit Rate (Mbps)	Digital Hierarchy Level
4DS8-15	1.544	DS1
4DS9-31	3.152	DS1C*
4DS0-63	6.312	DS2
4DS6-44	44.736	DS3
4DS6-27	274.176	DS4*

11.3.4 Service Designator/Network Channel Code Conversion Table

The purpose of this table is to show the relationship between the service designator codes (e.g., VGC, MT2, etc.), and the network channel codes that are used for various administrative purposes.

Service Designator Code	Network Channel Code
MTC	MQ
MT1	NT
MT2	NU
MT3	NV
TGC	NQ
TG1	NW

* Not applicable in the following jurisdictions:
Citizens Telecommunications Company of Arizona
Citizens Telecommunications Company of California

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.4 Service Designator/Network Channel Code Conversion Table (Cont'd)

Service Designator Code	Network Channel Code
TG2	NY
VGC	LQ
VG1	LB
VG2	LC
VG3	LD
VG4	LE
VG5	LF
VG6	LG
VG7	LH
VG8	LJ
VG9	LK
VG10	LN
VG11	LP
VG12	LR
APC	PQ
AP1	PE
AP2	PF
AP3	PJ
AP4	PK
TVC	TQ
TV1	TV
TV2	TW
WA1	WJ
WA1T	WQ
WA2	WL
WA2A	WR
WA3	WN

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.4 Service Designator/Network Channel Code Conversion Table (Cont'd)

Service Designator Code	Network Channel Code
WA4	WP
WD1	WB
WD2	WE
WD3	WF
DA1	XA
DA2	XB
DA3	XG
DA4	XH
HC0	HS
HC1	HC
HC1C	HD
HC2	HE
HC3	HF
HC4	HG

11.3.5 Compatible Channel Interfaces

The following tables show the channel interface codes (CIs) which are compatible:

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.5 Compatible Channel Interfaces (Cont'd)

(A) Metallic

Compatible CIs		Compatible CIs	
4AH5-B	2DC8-1•	4AH6-D	2DC8-2•
4AH5-B	24C8-2•	2DC8-1	2DC8-2
4AH6-C	2DC8-1•	2DC8-3	2DC8-3
4AH6-C	2DC8-2•	4DS9-*	2DC8-1•
4AH6-D	2DC8-1•	4DS9-*	2DC8-2•
4DS8-*	2DC8-1	4DS8-*	2DC8-2

(B) Voice Grade

Compatible CIs		Compatible CIs		Compatible CIs	
4AB2	4AB2				
4AB2	4AC2	4AH5-B	6DA2•	4AH6-D	2DY2•
4AB3	4AC2	4AH5-B	4DA2•	4AH6-C	9DY2•
4AB2	2AC2	4AH5-B	2DA2•	4AHG-C	9DY3•
4AB3	2AC2			4AH6-C	6DY2•
2AB2	2AC2	4AH6-D	4DE2•	4AH6-C	6DY3•
2AB3	2AC2	4AH6-C	4DE2•	4AH6-C	4DY2•
		4AH5-B	4DE2•	4AH6-C	2DY2•
4AB2	4SF2	4AH6-D	2DE2•	4AH5-B	9DY2•
4AB3	4SF2	4AH6-C	2DE2•	4AH5-B	9DY3•
		4AH5-B	2DE2•	4AH5-B	6DY2•
4AH6-D	4AC2•			4AH5-B	6DY3•
4AH6-D	2AC2•	4AH6-D	4DX3•	4AH5-B	4DY2•
4AH6-C	4AC2•	4AH6-C	4DX3•	4AH5-B	2DY2•
4AH6-C	2AC2•	4AH5-B	4DX3•		
4AH5-B	4AC2•	4AH6-D	4DX2•	4AH6-D	9EA2•
4AH5-B	2AC2•	4AH6-C	4DX2•	4AH6-D	9EA3•
		4AH5-B	4DX2•	4AH6-D	6EA2-E•

* See 11.3 preceding for explanation.

\+ Supplemental Channel Assignment information required.

• Not applicable in Citizens Telecommunications Company of Arizona or Citizens Telecommunications Company of California.

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.5 Compatible Channel Interfaces (Cont'd)

(B) Voice Grade (Cont'd)

Compatible CIs		Compatible Cis		Compatible CIs	
4AH6-D	2CT3•			4AH6-D	6EA2-M•
				4AH6-D	4EA2-E•
4AH6-C	2CT3•			4AH6-D	4EA2-M•
4AH5-B	2CT3•			4AH6-C	9EA2•
4AH6-D	6DA2•			4AJ7-C	9EA3•
4AH6-D	4DA2•	4AH6-D	9DY2•	4AH6-C	6EA2-E•
4AH6-D	2DA2•	4AH6-D	9DY3•		
4AH6-C	6DA2•	4AH6-D	6DY2•		
4AH6-C	4DA2•	4AH6-D	6DY3•		
4AH6-C	2DA2•	4AH6-D	4DY2•		
4AH6-C	6EA2-M•	4AH6-D	6GS2•	4AH6-D•	2LO2•
4AH6-C	4EA2-E•	4AH6-D	4GS2•	4AH6-C•	2LO3•
4AH6-C	4EA2-M•	4AH6-D	2GS3•	4AH6-C•	2LO2•
4AH5-B	9EA2•	4AH6-D	2GS2•	4AH5-B•	2LO3•
4AH5-B	9EA3•	4AH6-C	6GS2•	4AH5-B•	2LO2•
4AH5-B	6EA2-E•	4AH6-C	4GS2•		
4AH5-B	6EA2-M•	4AH6-C	2GS3•	4AH6-B•	4LR2•
4AH5-B	4EA2-E•	4AH6-C	2GS2•	4AH6-D•	2LR2•
4AH5-B	4EA2-M•	4AH5-B	6GS2•	4AH6-C•	4LR2•
		4AH5-B	4GS2•	4AH6-C•	2LR2•
4AH6-D	8EB2-E•	4AH5-B	2GS3•	4AH5-B•	4LR2•
4AH6-D	8EB2-M•	4AH5-B	2GS2•	4AH5-B•	2LR2•

• Not applicable in Citizens Telecommunications Company of Arizona or Citizens Telecommunications Company of California.

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.5 Compatible Channel Interfaces (Cont'd)

(B) Voice Grade (Cont'd)

Compatible CIs		Compatible Cis		Compatible CIs	
4AH6-D	6EB2-E•				
4AH6-D	6EB2-M•	4AH6-D	2LA2•	4AH6-D	6LS2•
4AH6-C	8EB2-E•	4AH6-C	2LA2•	4AH6-D	4LS2•
4AH6-C	8EB2-M•	4AH5-B	2LA2•	4AH6-D	2LS2•
4AH6-C	6EB2-E•			4AH6-D	2LS3•
4AH6-C	6EB2-M•	4AH6-D	2LB2•	4AH6-C	6LS2•
4AH5-B	8EB2-E•	4AHG-C	2LB2•	4AH6-C	4LS2•
4AH5-B	8EB2-M•	4AH5-B	2LB2•	4AH6-C	2LS2•
4AH5-B	6EB2-E•			4AH6-C	2LS3•
4AH5-B	6EB2-M•	4AH6-D	2LC2•	4AH5-B	6LS2•
		4AH6-C	2LC2•	4AH5-B	4LS2•
4AH6-D	2GO2•	4AH5-B	2LC2•	4AH5-B	2LS2•
4AH6-D	2GO3•				
4AH6-C	2GO2•				
4AH6-C	2GO2•			4AH5-B	2LS3•
4AH5-B	2GO2•	4AH6-D	2LO3•		
4AH5-B	2GO3•				
4AH6-D	4NO2•	4AH6-D	4TF2•	2CT3	8EB2-E
4AH6-D	2NO2•	4AJ7-D	2TF2•	2CT3	8EB2-M
4AH6-C	4NO2•	4AH6-C	4TF2•		
4AH6-C	2NO2•	4AH6-C	2TF2•	2CT3	6482-E•
4AH5-B	4NO2•	4AH5-B	4TF2•	2CT3	6EB2-M
4AH5-B	2NO2•	4AH5-B	2TF2•		

• Not applicable in Citizens Telecommunications Company of Arizona or Citizens Telecommunications Company of California.

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.5 Compatible Channel Interfaces (Cont'd)

(B) Voice Grade (Cont'd)

Compatible CIs		Compatible Cis		Compatible CIs	
				2CT3	6EB3-E
			2CT3	4DS9-*•	
				2CT3	8EC2
		2CT3	6DX2		
		2CT3	4DX2	2CT3	4SF2
		2CTS	4DX3	2CT3	4SF3
4AH6-D	4PR2•	2CT3	9DY3	6DA2	6DA2
4AH6-D	2PR2•	2CT3	6DY3	6DA2	4DA2
4AH6-C	4PR2•	2CT3	9DT2•	4DA2	4DA2
4AH6-C	2PR2•	2CT3	6DY2		
4AH5-B	4PR2•	2CT3	4DY3•	4DB2	6DA2
4AH5-B	2PR2•	2CT3	2DY2	4DB2	4DA2
		4DB2	2DA2		
4AH6-D	4RV2-T•	2CT3	9EA3	2DB3	2DA2
4AH6-D	2RV2-T•	2CT3	9EA2	2DB2	2DA2
4AH6-C	4RV2-T•	2CT3	6EA2-E	4DB2	4DB2
4AH6-C	2RV2-T•	2CT3	6EA2-M	4DB2	4NO2
4AH5-B	4TV2-T•	2CT3	4EA2-E	4DB2	2NO2
4AH5-B	2RV2-T•	2CT3	4EA2-M	2DB2	2NO2
4AH6-D	4SF2•			4DB2	4PR2
4AH6-C	4SF2•			4DB2	2PR2
2CT3	2DY2				
	4DS8*				
	4DY2				
	6EB2-E				
	9DY2				

* See 11.3 preceding for explanation.

• Not applicable in Citizens Telecommunications Company of Arizona or Citizens Telecommunications Company of California.

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.5 Compatible Channel Interfaces (Cont'd)

(B) Voice Grade (Cont'd)

Compatible CIs		Compatible CIs	
4AH5-B	4SF2•	2DB2	2PR2
4AH6-D	4SF3•		
4AH6-C	4SF3•		
4AH5-B	4SF3•		
4DD3	4DE2	4DS8-*	9DY3
4DD3	2DE2	4DS8-*	9DY2
		4DS8-*	6DY3
4DS8-*	4AC2	4DS8-*	6DY2
4DS8-*	2AC2	4DS8-*	4DY2
		4DS8-*	2DY2
4DS8-*	6DA2		
4DS8-*	4DA2		
4DS8-*	2DA2	4DS8-*	9EA2
		4DS8-*	9EA3
4DS8-*	4DE2	4DS8-*	6EA2-E
4DS8-*	EDE2	4DS8-*	6EA2-M
		4DS8-*	4EA2-E
4DS8-*	4DX3		
4DS8-*	4DX2		

* See 11.3 preceding for explanation.

• Not applicable in Citizens Telecommunications Company of Arizona or Citizens Telecommunications Company of California.

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.5 Compatible Channel Interfaces (Cont'd)

(B) Voice Grade (Cont'd)

Compatible CIs		Compatible CIs				Compatible CIs			
4DS8-*	8EB2-E	4DS8-*	4NO2		4DX3		9DY2		
4DS8-*	8EB2-M	4DS8-*	2NO2		4DX2		6DY3		
4DS8-*	6EB2-E			4DX3		6DY3			
4DS8-*	6EB2-M	4DS8-*	4PR2		4DX2		6DY2		
		4DS8-*	2PR2		4DX3		6DY2		
4DS8-*	2GO2	4DX2		4DY2					
4DS8-*	2GO3	4DS8-*	4RV2-T	4DX3		4DY2			
4DS8-*	6GS2	4DS8-*	2RV2-T	4DX2		2DY2			
4DS8-*	4GS2•			4DX3		2DY2			
4DS8-*	2GS2	4DS8-*	4SF2						
4DS8-*	2GS3	4DS8-*	4SF3		6DX2		9EA3		
				6DX2		9EA2			
4DS8-*	2LA2	4DS8-*	4TF2		6DX2		6EA2-E		
		4DS8-*	2TF2		6DX2		6EA2-M		
4DS8-*	2LB2					6DX2		4EA2-E	
		4DX2		4DX2		6DX2		4EA2-M	
8DS8-*	2LC2•	4DX3		4DX2		4DX2		9EA2	
		4DX3		4DX3		4DX3		9EA2	
4DS8-*	2LO2			4DX2		9EA3			
4DS8-*	2LO3	6DX2		9DY3		4DX3		9EA3	

* See 11.3 preceding for explanation.

• Not applicable in Citizens Telecommunications Company of Arizona or Citizens Telecommunications Company of California.

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.5 Compatible Channel Interfaces (Cont'd)

(B) Voice Grade (Cont'd)

Compatible CIs		Compatible CIs		Compatible CIs	
		6DX2	9DY2	4DX2	6EA2-E
4DS8-*	4LR2	6DX2	6DY3	4DX3	6EA2-E
4DS8-*	2LR2	6DX2	6DY2	4DX2	6EA2-M
		6DX2	4DY2	4DX3	6EA2-M
4DS8-*	6LS2	6DX2	2DY2	4DX2	4EA2-E
4DS8-*	4LS2	4DX2	9DY3	4DX3	4EA2-E
4DS8-*	2LS2•	4DX3	9DY3	4DX2	4EA2-M
4DS8-*	2LS3	4DX2	9DY2	4DX3	4EA2-M
6DX2	8EB2-E	4DX2	6LS2	9DY2	6DY3
6DX2	8EB2-M	4DX3	6LS2	9DY3	4DY2
6DX2	6EB2-E	4DX3	4LS2	9DY2	4DY2
6DX2	6EB2-M	4DX2	4LS2	9DY2	2DY2
4DX2	8EB2-E	4DX3	2LS3	9DY3	2DY2
4DX2	8EB2-M	4DX2	2LS3	6DY3	6DY3
4DX3	8EB2-E	4DX3	2LS2	6DY3	6DY2
4DX3	8EB2-M	4DX2	2LS2	6DY2	6DY2
4DX2	6EB2-E	2DX3	2LS2	6DY3	4DY2
4DX2	6EB2-M	2DX3	2LS3	6DY3	2DY2
4DX3	6E82-E•			6DY2	4DY2
4DX3	6EB2-M	4DX3	4RV2-T6DY2	2DY2	
		4DX2	4RV2-T4DY2	2DY2	

• Not applicable in Citizens Telecommunications Company of Arizona or Citizens Telecommunications Company of California.

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.5 Compatible Channel Interfaces (Cont'd)

(B) Voice Grade (Cont'd)

Compatible CIs		Compatible CIs		Compatible CIs	
4DX2	2LA2	4DX3	2RV2-T	4DY2	4DY2
4DX3	2LA2	4DX2	2RV2-T		
2DX3	2LA2			6EA2-E	4AC2
		6DX2	4SF2	6EA2-M	4AC2
4DX2	2LB2	4DX2	4SF2	6EA2-E	2AC2
4DX3	2LB2	4DX3	4SF2	6EA2-M	2AC2
2DX3	2LB2	4DX2	4SF3		
		4DX3	4SF3	9EA2	9DY3
4DX2	2LC2			9EA2	9DY2
4DX3	2LC2	9DY3	9DY3	9EA2	6DY3
2DX3	2LC2	9DY3	9DY2	9EA2	6DY2
		9DY2	9DY2	9EA2	4DY2
4DX2	2LO3	9DY3	6DY3	9EA2	2DY2
4DX3	2LO3	9DY3	6DY2	9EA3	9DY3
2DX3	2LO3	9DY2	6DY2		
9EA3	9DY2	4EA2-M	9DY2	4EA3-E	9EA2
9EA3	6DY3	4EA2-M	6DY3	4EA3-E	9EA3
9EA3	6DY2	4EA2-M	6DY2	4EA2-M	4EA2-M
9EA3	4DY2	4EA2-M	4DY2		
9EA3	2DY2	4EA2-M	2DY2	9EA2	8EB2-E

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.5 Compatible Channel Interfaces (Cont'd)

(B) Voice Grade (Cont'd)

Compatible CIs		Compatible CIs		Compatible CIs	
6EA2-E	9DY3			9EA2	8EB2-M
6EA2-E	9DY2	9EA2	9EA2	9EA2	6EB2-E
6EA2-E	6DY3	9EA2	9EA3	9EA2	6EB2-M
6EA2-E	6DY2	9EA2	6EA2-E	9EA3	8EB2-E
6EA2-E	4DY2	9EA2	6EA2-M	9EA3	8E82-M
6EA2-E	2DY2	9EA2	4EA2-E	9EA3	6EB2-E
6EA2-M	9DY3	9EA2	4EA2-M	9EA3	6EB2-M
6EA2-M	9DY2	9EA3	9EA3	6EA2-E	8EB2-E
6EA2-M	6DY3	9EA3	6EA2-E	6EA2-E	8EB2-M
6EA2-M	6DY2	9EA3	6EA2-M	6EA2-E	6EB2-E
6EA2-M	4DY2	9EA3	4EA2-E	6EA2-E	6EB2-M
6EA2-M	2DY2	9EA3	4EA2-M	6EA2-M	8EB2-E
4EA2-E	9DY3	6EA2-E	6EA2-E	6EA2-M	8E82-M
4EA2-E	9DY2	6EA2-E	6EA2-M	6EA2-M	6EB2-E
4EA3-E	9DY3	6EA2-M	6EA2-M	6EA2-M	6EB2-M
4EA3-E	9DY2	6EA2-E	4EA2-E	4EA2-E	8EB2-E•
4EA3-E	6DY3	6EA2-E	4EA2-M	4EA2-E	8EB2-M
4EA3-E	6DY2	6EA2-M	4EA2-E	4EA3-E	8EB2-E
4EA3-E	4DY2	6EA2-M	4EA2-M	4EA3-E	8E82-M•
4EA3-E	2DY2	4EA2-E	4EA2-E	4EA2-E	6EB2-E
4EA2-E	6DY3	4EA3-E	6EA2-E	4EA2-E	6EB2-M
4EA2-E	6DY2	4EA3-E	6EA2-M	4EA3-E	6EB2-E
4EA2-E	4DY2	4EA3-E	4EA2-E	4EA3-E	6EB2-M
4EA2-E	2DY2	4EA3-E	4EA2-M	4EA2-M	8EB2-E
4EA2-M	9DY3	4EA2-E	4EA2-M		

• Not applicable in Citizens Telecommunications Company of Arizona or Citizens Telecommunications Company of California.

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.5 Compatible Channel Interfaces (Cont'd)

(B) Voice Grade (Cont'd)

Compatible CIs		Compatible CIs		Compatible CIs	
4EA2-M	8EB2-M	9EA3	43F2•	6EB3-E	9DY2
4EA2-M	6EB2-E	9EA2	4SF2•	6EB3-E	9DY3
4EA2-M	6EB2-M	6EA2-E	4SF3	6EB2-E	6DY2
		6EA2-M	4SF3	6EB3-E	6DY2
6EA2-E	2LA2	6EA2-E	4SF2	6EB2-E	6DY3
6EA2-M	2LA2	6EA2-M	4SF2	6EB3-E	6DY3
		4EA3-E	4SF2	6EB2-E	4DY2
6EA2-E	2LB2	4EA2-E	4SF2	6EB3-E	2DY2
6EA2-M	2LB2	4EA2-M	4SF2	6EB3-E	4DY2
				6EB2-M	9DY2
6EA2-E	2LC2	8EB2-E	4AC2	6EB2-M	9DY3
6EA2-M	2LC2	8EB2-M	4AC2	6EB2-M	6DY2
		8EB2-E	2AC2	6EB2-M	6DY3
6EA2-E	2LO3	8EB2-M	2AC2	6EB2-M	4DY2
6EA2-M	2LO3			6EB2-E	2DY2
		8EB2-E	9DY3	6EB2-M	2DY2
6EA2-E	6LS2	8EB2-E	9DY2		
6EA2-M	6LS2	8EB2-E	6DY3	6EB3-E	9EA2
6EA2-E	4LS2	8EB2-E	6DY2	6EB3-E	9EA3
6EA2-M	4LS2	8EB2-E	4DY2	6EB3-E	6EA2-E
6EA2-E	2LS2	8EB2-E	2DY2	6EB3-E	6EA2-M
6EA2-M	2LS2	8EB2-M	9DY3	6EB3-E	4EA2-E
6EA2-E	2LS3	8EB2-M	9DY2	6EB3-E	4EA2-M
6EA2-M	2LS3	8EB2-M	6DY3		

• Not applicable in Citizens Telecommunications Company of Arizona or Citizens Telecommunications Company of California.

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.5 Compatible Channel Interfaces (Cont'd)

(B) Voice Grade (Cont'd)

Compatible CIs		Compatible CIs				Compatible CIs	
		8EB2-M	6DY2			8EB2-E	8EB2-E
6EA2-E	4RV2-T	8EB2-M	4DY2			8EB2-E	8EB2-M
6EA2-M	4RV2-T	8EB2-M	2DY2			8EB2-M	8EB2-M
6EA2-E	2RV2-T	6EB2-E	9DY2			8EB2-E	6EB2-E
6EA2-M	2RV2-T	6EB2-E	9DY3			8EB2-E	6EB2-M
8EB2-M	6EB2-E	8EB2-E	4RV2-T	8EC2			8EB2-M
8EB2-M	6EB2-M	8EB2-M	4RV2-T	8EC2			6EB2-E
6EB2-E	6EB2-E	8EB2-E	2RV2-T	8EC2			6EB2-M
6EB2-E	6EB2-M	8EB2-M	2RV2-T				
6EB3-E	8EB2-E					8EC2	4SF2
6EB3-E	8EB2-M	8EB2-E	4SF2			6EX2-B	2GO3
6EB2-M	6EB2-M	8EB2-M	4SF2			6EX2-A	6GS2
		8EB2-E	4SF3			6EX2-A	4GS2
8EB2-E	2LA2	8EB2-M	4SF3			6EX2-A	2GS2
8EB2-M	2LA2	6EB3-E	4SF2			6EX2-A	2GS3
		6EB2-E	4SF2				
8EB2-E	2LB2	6EB2-M	4SF2			6EX2-B	2LA2
8EB2-M	2LB2						
		8EC2	9DY2			6EX2-B	2LB2
8EB2-E	2LC2	8EC2	9DY3				
8EB2-M	2LC2	8EC2	6DY2			6EX2-B	2LC2

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.5 Compatible Channel Interfaces (Cont'd)

(B) Voice Grade (Cont'd)

Compatible CIs		Compatible CIs		Compatible CIs	
		8EC2	6DY3		
8EB2-E	2LO3	8EC2	4DY2	6EX2-B	2LO2
8EB2-M	2LO3	8EC2	2DY2	6EX2-B	2LO3
8EB2-E	6LS2	8EC2	9EA2	6EX2-B	4LR2
8EB2-M	6LS2	8EC2	9EA3	6EX2-B	2LR2
8EB2-E	4LS2	8EC2	6EA2-E		
8EB2-M	4LS2	8EC2	6EA2-M	6EX2-A	6LS2
8EB2-E	2LS2	8EC2	4EA2-E	6EX2-A	4LS2
8EB2-M	2LS2	8EC2	4EA2-M	6EX2-A	2LS2
8EB2-E	2LS3			6EX2-A	2LS3
8EB2-M	2LS3	8EC2	8EB2-E		
6EX2-A	4SF2	6LO2	6LS2	4LR2	4SF2
6EX2-B	4SF2	6LO2	4LS2	4LR3	4SF2
		6LO2	2LS2		
6GO2	6GS2	6LO2	2LS3	6LS2	2LA2
6GO2	4GS2	4LO2	6LS2	4LS2	2LA2
6GO2	2GS2	4LO2	4LS2	4LS3	2LA2
6GO2	2GS3	4LO3	6LS2	2LS2	2LA2
4GO2	6GS2	4LO3	4LS2	2LS3	2LA2
4GO3	6GS2	4LO3	2LS3		

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.5 Compatible Channel Interfaces (Cont'd)

(B) Voice Grade (Cont'd)

Compatible CIs		Compatible CIs		Compatible CIs	
4GO2	4GS2	4LO3	2LS2	6LS2	2LB2
4GO3	4GS2	4LO2	2LS2	4LS2	2LB2
4GO2	2GS2	4LO2	2LS3	4LS3	2LB2
4GO2	2GS3	2LO3	2LS3	2LS2	2LB2
4GO3	2GS2	2LO3	2LS2	2LS3	2LB2
4GO3	2GS3	2LO2	2LS2		
2GO2	2GS2	2LO2	2LS3	6LS2	2LC2
2GO3	2GS2			4LS2	2LC2
2GO2	2GS3	6LO2	4SF2	4LS3	2LC2
2GO3	2GS3	4LO2	4SF2	2LS2	2LC2
		4LO3	4SF2	2LS3	2LC2
6GO2	4SF2				
4GO2	4SF2	4LR2	4LR1•	6LS2	2LO3
4GO3	4SF2	4LR3	2LR2	6LS2	2LO2
		4LR2	4LR2	4LS2	2LO2
6GS2	2GO2•	4LR2	2LR2	4LS2	2LO3
4GS2	2GO2•	2LR2	2LR2	4LS3	2LO2
4GS3	2GO2•	2LR3	2LR2	4LS3	2LO3
4GS2	2GO3•				

• Not applicable in Citizens Telecommunications Company of Arizona or Citizens Telecommunications Company of California.

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.5 Compatible Channel Interfaces (Cont'd)

(B) Voice Grade (Cont'd)

Compatible CIs			Compatible Cis			Compatible CIs	
6LS2	4SF2		4SF3	9DY2		4SF3	2LA2
4LS3	4SF2		4SF2	9DY3			
			4SF3	6DY3		4SF2	2LB2
4NO2	6DA2					4SF3	2LB2
4NO2	4DA2		4SF2	6DY3			
4NO2	2DA2		4SF3	6DY2		4SF2	2LC2
2NO2	2DA2		4SF2	4DY2		4SF3	2LC2
			4SF3	4DY2			
4NO2	4DE2		4SF3	2DY2		4SF2	2LO3
4NO2	2DE2		4SF2	2DY2		4SF3	2LO3
4NO2	4NO2		4SF3	9EA2		4SF2	2LR2
4NO2	2NO2		4SF3	9EA3		4SF3	4LR2
2NO2	2NO2		4SF3	4EA2-E		4SF3	2LR2
2NO3	2NO2		4SF3	4EA2-M			
						4SF3	6LS2
2NO3	2PR2		4SF3	6EB2-E		4SF2	4LS2
			4SF3	6EB2-M		4SF3	4LS2
4RV2-0	4RV2-T	4SF3	2GO3		4SF2	2LS2	
4RV2-0	2RV2-T	4SF3	6GS2		4SF2	2LS3	
			4SF2	6GS2		4SF3	2LS2
						4SF3	2LS3
4RV2-0	4SF2		4SF3	4GS2			
			4SF2	2GS2		4SF3	4RV2-T
4SF2	4AC2		4SF2	2GS3		4SF2	4RV2-T
4SF2	2AC2		4SF3	2GS2		4SF2	2RV2-T
			4SF3	2GS3		4SF3	2RV2-T
4SF3	9DY3						
4SF2	9DY2		4SF2	2LA2		4SF3	4SF3

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.5 Compatible Channel Interfaces (Cont'd)

(B) Voice Grade (Cont'd)

Compatible CIs

4SF3	4SF2
4SF2	4SF2
4TF2	4TF2
4TF2	2TF2
2TF3	2TF2
4AC2	2AC2
	4AC2
4DS8-*	4EA2M
4DS8*-	4DG2
4DX3	6EB2-E
4EA2-E	8EABZ-E
4EA3-E	9EB2-M
4G02	2G02
	2G03
4G03	2G02
4GS	2GS
	2LS
	4GS
	4LS
4SF2	6DY2
4LR3	4LR2
8G02	2G02

*See 11.3 preceding for explanation.

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.5 Compatible Channel Interfaces (Cont'd)

(C) Program Audio

Compatible CIs		Compatible CIs			Compatible CIs	
4AH5-B	2PG1-3•	4AH6-D	2PG1-3•		4DS8-I5F	2PG2-5
4AH5-B	2PG1-5•	4AH6-D	2PG1-5•		4DS8-I5G	2PG2-8
4AH5-B	2PG1-8•	4AH6-D	2PG1-8•		4DS8-15H	2PG2-1
4AH5-B	2PG2-3•	4AH6-D	2PG2-3•		2PG2-1	2PG1-1
4AH5-B	2PG2-5•	4AH6-D	2PG2-5•		2PG2-1	2PG2-I
4AH5-B	2PG2-8•	4AH6-D	2PG2-8•		2PG2-3	2PGI-3
4AH6-C	2PG1-3•	4DS8-15E	2PG1-3	2PG2-3	2PG2-3	
4AH6-C	2PG1-5•	4DS8-15F	2PG1-5	2PG2-5	2PG1-5	
4AH6-C	2PG1-8•	4DS8-15G	2PG1-8	2PG2-5	2PG2-5	
4AH6-C	2PG2-3•	4DS8-15H	2PG1-1	2PG2-8	2PG1-8	
8AH6-C	2PG2-5•	4DS8-15E	2PG2-3	2PG2-8	2PG2-8	

(D) Video

Compatible CIs		Compatible CIs	
2TV6-1	4TV6-15•	4TV7-5	4TV6-5•
	4TV7-15•		4TV7-5•
2TV6-2	6TV6-15•	4TV7-15	4TV6-15•
	6TV7-15•		4TV7-15•
2TV7-1	4TV6-15•	6TV6-5	6TV6-5•
	4TV7-15•		6TV7-5•
2TV7-2	6TV6-15•	6TV6-15	6TV6-15•
	6TV7-15•		6TV7-15•
4TV6-5	4TV6-5•	6TV7-5	6TV6-5•
		4TV7-5	6TV7-5•
4TV6-15	4TV6-15•	6TV7-15	6TV6-15•
	4TV7-15•		6TV7-15•

• Not applicable in Citizens Telecommunications Company of Arizona or Citizens Telecommunications Company of California.

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.5 Compatible Channel Interfaces (Cont'd)

(E) Digital Data

Compatible CIs		Compatible CIs		Compatible CIs	
			4DS8-15	6DU5-48	
4DS8-15	4DU8-15+	4DS8-15	6DU5-56•	4DU5-96	4DU5-96
4DS8-15	4DU8-24	4DS8-15	6DU5-96•	6DU5-24	6DU5-24•
4DS8-15	4DU8-48	4DU5-24	4DU5-24	6DU5-48	6DU5-48•
4DS8-15	4DU8-56	4DU5-48	4DU5-48	6DU5-56	6DU5-56
4DS8-15	6DU5-96•	4DU8-56	4DU5-56	6DU5-96	6DU5-96•
4DS8-I5	6DU5-24•	4DS9-15	4DU5-19	4DS6-44A	4DU5-19
4DS9-15B	4DU5-64X•	4DS6-44A	4DU5-64X•		

\+ Available only as a cross connect of two digital circuits at appropriate digital speeds at a Telephone Company hub.

• Not applicable in Citizens Telecommunications Company of Arizona or Citizens Telecommunications Company of California.

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)

11.3.5 Compatible Channel Interfaces (Cont'd)

(F) High Capacity

Compatible CIs		Compatible CIs	
		4DS8-15	4DU8-8
4DSO-63	4DSO-63•	4DS8-I5J	6DU8-A
4DSO-63	6DU8-A,B or C•	4DS8-15J	4DU8-A
4DSO-63	4DU8-A,B or C•	4DS8-15K	6DU8-B
4DS6-27	4DS6-27•	4DS8-I5K	4DU8-B
4DS6-27	6DU8-A,B or C•	4DS8-15K	6DU8-C
4DS6-27	4DU8-A,B or C•	4DS8-15K	4D78-C
4DS6-44	4DS6-44•	4DS9-31	4DS9-31•
4DS6-44	6DU8-A,B or C•	4DS9-31	6DU8-A,B or C•
4DS6-44	4DU8-A,B or C•	4DS9-	4DU8-A,B or C•
4DS8-15	4DS8-15+	4DU9-A,B or C	4DU8-A,B or C•
4DS8-15	6DU8-B	4DS9-15	4DU5-19•
4DS6-44	A4DU5-19•	4DS9-15B	4DU5-64•
4DS6-44	A 4DU5-64•		
4DS8-15	4DU8-B	4DU8-A,B or C	4DU8-A,B or C

• Not applicable in Citizens Telecommunications Company of Arizona or Citizens Telecommunications Company of California.

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.4 Wats Access Line Standard Transmission Specifications

11.4.1 Standard Two-Wire Voice Transmission Specifications

(A) Loss Deviation

The maximum Loss Deviation of the 1004 Hz loss relative to the Expected Measured Loss (EML) is plus or minus 4.0 dB.

(B) Attenuation Distortion

The maximum Attenuation Distortion in the 404 to 2804 Hz frequency band relative to the loss at 1004 Hz is -3.0 dB to +9.0 dB.

(C) C-Message Noise

The maximum C-Message Noise for the transmission path at the route miles listed is less than:

Route Miles	C-Message Noise
Less than 50	35 dBrnCO
51 to 100	37 dBrnCO
101 to 200	40 dBrnCO
201 to 400	43 dBrnCO
401 to 1000	45 dBrnCO

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.4 Wats Access Line Standard Transmission Specifications (Cont'd)

11.4.1 Standard Two-Wire Voice Transmission Specifications (Cont'd)

(D) Echo Control

Return Loss for both Echo Return Loss (ERL) and Singing Return Loss (SRL), is equal to or greater than:

ERL	6.0 dB
SRL	3.0 dB

11.4.2 Standard Four-Wire Voice Transmission Specifications

(A) Loss Deviation

The maximum Loss Deviation of the 1004 Hz loss relative to the Expected Measured Loss (EML) is -3.0 dB to +3.0 dB.

(B) Attenuation Distortion

The maximum Attenuation Distortion in the 404 to 2804 Hz frequency band relative to loss at 1004 Hz is -1.0 dB to +4.5 dB.

(C) C-Message Noise

The maximum C-Message Noise for the transmission path at the route miles listed is less than:

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.4 Wats Access Line Standard Transmission Specifications (Cont'd)

11.4.2 Standard Four-Wire Voice Transmission Specifications (Cont'd)

(C) C-Message Noise (Cont'd)

Route Miles	C-Message Noise
Less than 50	35 dBrnCO
51 to 100	37 dBrnCO
101 to 200	40 dBrnCO
201 to 400	43 dBrnCO
401 to 1000	45 dBrnCO

(D) Echo Control

The Equal Level Echo Path Loss for both Echo Return Loss (ERL) and Singing Return Loss (SRL), is equal to or greater than:

ERL	15.0 dB
SRL	9.0 dB

11.5 Wats Access Line Data Transmission Parameters

11.5.1 Signal to C-Notched Noise Ratio

The maximum Signal-to-C-Notched Noise Ratio is 30 dB.

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.5 Wats Access Line Data Transmission Parameters (Cont'd)

11.5.2 Envelope Delay Distortion

The maximum Envelope Delay Distortion for the frequency bands specified is:

1000	microseconds	604 to 2804 Hz
500	microseconds	1000 to 2404 Hz

11.5.3 Impulse Noise Counts

The Impulse Noise Counts exceeding a 67 dBrnCO threshold in 15 minutes is no more than 15 counts.

(A) Intermodulation Distortion

The Second Order (R2), and Third Order (R3) Intermodulation Distortion products are equal to or greater than:

Second Order (R2)	31 dB
Third Order (R3)	34 dB

11.5.4 Phase Jitter

The Phase Jitter over the 4 to 300 Hz frequency band is less than or equal to 7 degrees peak-to-peak.

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.5 Wats Access Line Data Transmission Parameters (Cont'd)

11.5.5 Frequency Shift

The maximum Frequency Shift does not exceed -2 to +2 Hz.

11.6 Wats Access Line Transmission Specifications

11.6.1 Improved Two-Wire Voice Transmission Specifications

(A) Loss Deviation

The maximum Loss Deviation of the 1004 Hz loss relative to the Expected Measured Loss (EML) is -4.0 to +4.0 dB.

(B) Attenuation Distortion

The maximum Attenuation Distortion in the 404 to 280 Hz frequency band relative to loss at 1004 Hz is -2.0 dB to +6.0 dB.

(C) C-Message Noise

The maximum C-Message Noise for the transmission path at the route miles listed is less than:

11. Interface Groups, Transmission Specifications and Channel Interfaces (Cont'd)

11.6 Wats Access Line Transmission Specifications (Cont'd)

11.6.1 Improved Two-Wire Voice Transmission Specifications (Cont'd)

Route Miles	C-Message Noise
Less than 50	35 dBrnCO
51 to 100	37 dBrnCO
101 to 200	40 dBrnCO
201 to 400	43 dBrnCO
401 to 1000	45 dBrnCO

(D) Return Loss

The Return Loss, expressed as Echo Return Loss (ERL) and Singing Return Loss (SRL), is equal to or greater than:

ERL	13.0 dB
SRL	6.0 dB