
ACCESS SERVICE

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 customer's 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.

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.

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.

ACCESS SERVICE

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

11.1 Local Transport Interface Groups (Cont'd)

11.1.1 Interface Group 1

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.

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.

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 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

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.

ACCESS SERVICE

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

11.1 Local Transport Interface Groups (Cont'd)

11.1.3 Interface Group 3

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

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 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.

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (Cont'd)11.1 Local Transport Interface Groups (Cont'd)11.1.5 Interface Group 5

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.

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

11.1.6 Interface Group 6

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.

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (Cont'd)11.1 Local Transport Interface Groups (Cont'd)11.1.7 Interface Group 7

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 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

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 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.

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (Cont'd)11.1 Local Transport Interface Groups (Cont'd)11.1.9 Interface Group 9

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.

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

11.1.10 Interface Group 10

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.

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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.

<u>Interface Group</u>	<u>Telephone Company Switch Supervisory Signaling</u>	<u>Premises Interface Code</u>	<u>Feature Group</u>			
			<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
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

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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	LO, GO	4SF2	X				
	LO, GO	4SF3	X				
	LO	4LS2	X				
	LO	4LS3	X				
	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
	4	LO, GO	4AH6-C	X			
RV, EA, EB, EC		4AH6-C		X	X	X	

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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
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
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

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (Cont'd)11.1 Local Transport Interface Groups (Cont'd)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 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.

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (Cont'd)11.2 Transmission Specifications Switched Access Service11.2.1 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:

(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:

<u>Route Miles</u>	<u>C-Message Noise</u>
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

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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 dBmCO.

(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:

	<u>Echo Return Loss</u>	<u>Singing Return Loss</u>
POT to Access Tandem	21 dB	4 dB
POT to End Office		
- Direct	N/A	N/A
- Via Access Tandem	16 dB	11 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:

	<u>Echo Return Loss</u>	<u>Singing Return Loss</u>
	5 dB	2.5 dB

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (Cont'd)11.2 Transmission Specifications Switched Access Service (Cont'd)11.2.1 Standard Transmission Specifications (Cont'd)(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.

(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:

<u>Route Miles</u>	<u>C-Message Noise*</u>	
	<u>Type B1</u>	<u>Type B2</u>
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

(4) C-Notch Noise

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

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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

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:

	<u>Echo Return Loss</u>	<u>Singing Return Loss</u>
POT to Access Tandem		
- Terminated in		
Four-wire (4) trunk	21 dB	14 dB
- Terminated in		
Two-wire (2) trunk	16 dB	11 dB
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 FGD access (effective two-wire (2) transmission path at end office)	13 dB	6 dB

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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)(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:

<u>Echo Return Loss</u>	<u>Singing Return Loss</u>
5 dB	2.5 dB

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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)

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:

<u>Route Miles</u>	<u>C-Message Noise*</u>	
	<u>Type B1</u>	<u>Type B2</u>
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
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

* 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.

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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)(4) C-Notch Noise

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

(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 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:

	<u>Echo Return Loss</u>	<u>Singing Return Loss</u>
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

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (Cont'd)11.2 Transmission Specifications Switched Access Service (Cont'd)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.

(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
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Equal to or greater than 50 route miles	900 microseconds
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1004 to 2404 Hz

Less than 50 route miles	200 microseconds
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Equal to or greater than 50 route miles	400 microseconds
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(3) Impulse Noise Counts

The Impulse Noise Counts exceeding a 65 dB_{rnCO} threshold in 15 minutes is no more than 15 counts.

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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.

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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
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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 dB_{rnCO} threshold in 15 minutes is no more than 15 counts.

(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.

ACCESS SERVICE

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

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

<u>Code</u>	<u>Option</u>	<u>Definition</u>
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

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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)

<u>Code</u>	<u>Option</u>	<u>Definition</u>
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
-	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

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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)

<u>Code</u>	<u>Option</u>	<u>Definition</u>
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
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

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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)

<u>Code</u>	<u>Option</u>	<u>Definition</u>
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)
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

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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)

<u>Code</u>	<u>Option</u>	<u>Definition</u>
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.
	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

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

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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)

<u>Code</u>	<u>Option</u>	<u>Definition</u>
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 kbps, 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
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

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (Cont'd)11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)11.3.2 Impedance

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

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

11.3.3 Digital Hierarchy Channel Interface Codes

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:

<u>Interface Code and Speed Option</u>	<u>Nominal Bit Rate (Mbps)</u>	<u>Digital Hierarchy Level</u>
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*

* 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.

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (Cont'd)11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)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.

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

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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)

<u>Service Designator Code</u>	<u>Network Channel Code</u>
WA1	WJ
WA1T	WQ
WA2	WL
WA2A	WR
WA3	WN
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:

(A) Metallic

<u>Compatible CIs</u>		<u>Compatible CIs</u>	
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

* See 11.3 preceding for explanation.

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (Cont'd)11.3 Special Access Channel Interface and Network Channel Codes (Cont'd)11.3.5 Compatible Channel Interfaces(B) Voice Grade

<u>Compatible CIs</u>		<u>Compatible CIs</u>		<u>Compatible CIs</u>	
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		
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		

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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)

<u>Compatible CIs</u>		<u>Compatible CIs</u>		<u>Compatible CIs</u>	
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
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

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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)

<u>Compatible CIs</u>		<u>Compatible CIs</u>		<u>Compatible CIs</u>	
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		
				2CT3 6	EB3-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				
2CT3	4DS8*				
2CT3	4DY2				
2CT3	6EB2-E				
2CT3	9DY2				
2CT3	6EB2-E				
2CT3	9DY2				

* See 11.3 preceding for explanation.

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11. Interface Groups, Transmission Specifications and Channel Code (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)

<u>Compatible CIs</u>		<u>Compatible CIs</u>		<u>Compatible CIs</u>	
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				
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

* See 11.3 preceding for explanation.

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ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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)

<u>Compatible CIs</u>		<u>Compatible CIs</u>		<u>Compatible CIs</u>	
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
		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-T	6DY2	2DY2
		4DX2	4RV2-T	4DY2	2DY2
4DX2	2LA2	4DX3	2RV2-T	4DY2	4DY2
4DX3	2LA2	4DX2	2RV2-T		
2DX3	2LA2			6EA2-E	4AC2
		6DX2	4SF2	6EA2-M	4AC2

* See 11.3 preceding for explanation.

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11. Interface Groups, Transmission Specifications and Channel Code (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)

<u>Compatible CIs</u>		<u>Compatible CIs</u>		<u>Compatible CIs</u>	
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
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	8EB2-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	8EB2-M
4EA2-E	9DY2	6EA2-E	6EA2-M	6EA2-M	6EB2-E

Issued: February 8, 2010

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(This page filed under Transmittal No. 1)
Vice President, Government and Regulatory Affairs
180 S. Clinton Ave., Rochester, NY 14646

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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)

<u>Compatible CIs</u>		<u>Compatible CIs</u>		<u>Compatible CIs</u>	
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		
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		

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(This page filed under Transmittal No. 1)
Vice President, Government and Regulatory Affairs
180 S. Clinton Ave., Rochester, NY 14646

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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)

<u>Compatible CIs</u>		<u>Compatible CIs</u>		<u>Compatible CIs</u>	
6EA2-E	4RV2-T	8EB2-M	6DY2	8EB2-E	8EB2-E
6EA2-M	4RV2-T	8EB2-M	4DY2	8EB2-E	8EB2-M
6EA2-E	2RV2-T	8EB2-M	2DY2	8EB2-M	8EB2-M
6EA2-M	2RV2-T	6EB2-E	9DY2	8EB2-E	6EB2-E
8EB2-M	6EB2-E	6EB2-E	9DY3	8EB2-E	6EB2-M
8EB2-M	6EB2-M	8EB2-E	4RV2-T	8EC2	8EB2-M
6EB2-E	6EB2-E	8EB2-M	4RV2-T	8EC2	6EB2-E
6EB2-E	6EB2-M	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
		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		

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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)

<u>Compatible CIs</u>		<u>Compatible CIs</u>		<u>Compatible CIs</u>	
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		
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				

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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)

<u>Compatible CIs</u>		<u>Compatible CIs</u>		<u>Compatible CIs</u>	
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				

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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)

<u>Compatible CIs</u>		<u>Compatible CIs</u>		<u>Compatible CIs</u>	
4SF2	9DY2	4SF2	2LA2	4SF3	4SF3
4SF3	4SF2				
4SF2	4SF2				
4TF2	4TF2				
4TF2	2TF2				
2TF3	2TF2				
4AC2	2AC2				
4AC2	4AC2				
4DS8-*	4EA2M				
4DS8*-	4DG2				
4DX3	6EB2-E				
4EA2-E	8EABZ-E				
4EA3-E	9EB2-M				
4G02	2G02				
4G02	2G03				
4G03	2G02				
4GS	2GS				
4GS	2LS				
4GS	4GS				
4GS	4LS				
4SF2	6DY2				
4LR3	4LR2				
8G02	2G02				

* See 11.3 preceding for explanation.

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Vice President, Government and Regulatory Affairs
180 S. Clinton Ave., Rochester, NY 14646

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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

<u>Compatible CIs</u>		<u>Compatible CIs</u>		<u>Compatible CIs</u>	
4AH5-B	2PG1-3	4AH6-D	2PG1-3	4DS8-15F	2PG2-5
4AH5-B	2PG1-5	4AH6-D	2PG1-5	4DS8-15G	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	2PG2-1
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

<u>Compatible CIs</u>		<u>Compatible CIs</u>	
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

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (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

<u>Compatible CIs</u>		<u>Compatible CIs</u>		<u>Compatible CIs</u>	
		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
4DS8-15	6DU5-24	4DS9-15	4DU5-19	4DS6-44A	4DU5-19
4DS9-15B	4DU5-64X	4DS6-44A	4DU5-64X		

(D) High Capacity

<u>Compatible CIs</u>		<u>Compatible CIs</u>	
		4DS8-15	4DU8-8
4DSO-63	4DSO-63	4DS8-15J	6DU8-A
4DSO-63	6DU8-A,BorC	4DS8-15J	4DU8-A
4DSO-63	4DU8-A,BorC	4DS8-15K	6DU8-B
4DS6-27	4DS6-27	4DS8-15K	4DU8-B
4DS6-27	6DU8-A,BorC	4DS8-15K	6DU8-C
4DS6-27	4DU8-A,BorC	4DS8-15K	4D78-C
4DS6-44	4DS6-44	4DS9-31	4DS9-31
4DS6-44	6DU8-A,BorC	4DS9-31	6DU8-A,BorC
4DS6-44	4DU8-A,BorC	4DS9-	4DU8-A,BorC
4DS8-15	4DS8-15+	4DU9-A,BorC	4DU8-A,BorC
4DS8-15	6DU8-B	4DS9-15	4DU5-19
4DS6-44A	4DU5-19	4DS9-15B	4DU5-64
4DS6-44A	4DU5-64		
4DS8-15	4DU8-B	4DU8-A,BorC	4DU8-A,BorC

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

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(This page filed under Transmittal No. 1)
Vice President, Government and Regulatory Affairs
180 S. Clinton Ave., Rochester, NY 14646

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (Cont'd)11.4 Wats Access Line Standard Transmission Specifications11.4.1 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:

<u>Route Miles</u>	<u>C-Message Noise</u>
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

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

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (Cont'd)11.4 Wats Access Line Standard Transmission Specifications (Cont'd)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:

<u>Route Miles</u>	<u>C-Message Noise</u>
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

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (Cont'd)11.5 Wats Access Line Data Transmission Parameters11.5.1 Signal to C-Notched Noise Ratio

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

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 dBnCO 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.

11.5.5 Frequency Shift

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

ACCESS SERVICE

11. Interface Groups, Transmission Specifications and Channel Code (Cont'd)11.6 Wats Access Line Transmission Specifications11.6.1 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:

<u>Route Miles</u>	<u>C-Message Noise</u>
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