Before the Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
The Pay Telephone Reclassification	)	
And Compensation Provisions of the	)	CC Docket No. 96-128
Telecommunications Act of 1996	)	DA 01-1967
	)	
RBOC/GTE/SNET Payphone Coalition	)	NSD File No. L-99-34
Petition for Clarification	)	

Opposition of CommuniGroup of K.C., Inc., CommuniGroup of Jackson, Inc., NTS Communications, Inc., Transtel Communications, Inc., Tel America of Salt Lake City, Inc., National Network Corporation and Extelcom d/b/a Express Tel, to Petitions for Reconsideration, Clarification, and Declaratory Ruling

CommuniGroup of K.C., Inc., d/b/a CGI
CommuniGroup of Jackson, Inc.
NTS Communications, Inc.
Transtel Communications, Inc.
Tel America of Salt Lake City, Inc.
National Network Corporation
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Summary

WorldCom has filed a Petition requesting that the Commission change its existing definition of a “completed” payphone call so that calls are deemed completed when delivered to the switch of a switch-based reseller. However, for calls that the facilities-based long distance carrier ("facilities-based IXC") transmits without switch-based reseller involvement, WorldCom would retain the current definition, which treats a call as completed when it “is answered by the called party.” The result would be a skewed regulation that requires facilities-based IXCs to pay the payphone service provider (PSP) only for calls completed to the called party, while switch-based resellers would be required to pay for both uncompleted and completed payphone calls. The unequal two-part definition would distort the competitive marketplace to the benefit of facilities-based IXCs and the detriment of consumers who might otherwise find the switch-based resellers’ offerings to be more attractive.

Knowing that other carriers and associations will be opposing WorldCom’s Petition (and AT&T’s similar Petition), the carriers making this filing (the “Switch-Based Resellers”) concentrate in their opposition on describing in some detail the flow of signaling information necessary to set up a long distance call. Pertinent excerpts from industry standard publications are attached for the Commission’s review. In the great majority of calls involving switch-based resellers, the signals passed to WorldCom or any other facilities-based IXC will be sufficient to enable the facilities-based IXC to determine when the call is completed to the called party.

The Switch-Based Resellers also present solutions that are available to the parties in those few instances in which the facilities-based IXC cannot tell whether a payphone call delivered to a switch-based reseller is answered by the called party. The Commission anticipated this problem in the *Second Order on Reconsideration* by directing facilities-based IXCs to make

arrangements with switch-based resellers to track calls to completion when the facilities-based IXC could not itself perform such tracking. Switch-based resellers desiring to avoid paying for uncompleted calls will have every incentive to provide information on call completion to facilities-based IXCs. Unfortunately, WorldCom has refused to negotiate such arrangements and is instead insisting on doing no tracking at all, by treating 100% of calls delivered to switch-based resellers as complete.

The Switch-Based Resellers note that Section 276 of the Communications Act directs the Commission to provide for compensation to the PSP only for "completed" calls. Obviously, calls that are delivered to a switch-based reseller but later dropped by that carrier or by the terminating local exchange carrier, or that are unanswered by the called party, are not completed. Thus, WorldCom's Petition seeks a rule contrary to statute.

Finally, the Switch-Based Resellers oppose the request of Global Crossings Telecommunications that the Commission ban contracts between switch-based resellers and PSPs that provide for direct payment by the switch-based reseller to the PSP. Such a ban on mutually agreeable arrangements that satisfy the PSPs right to compensation would be totally contrary to the Commission's policy of encouraging the operation of market forces, rather than regulation, in resolving payphone compensation issues.

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The undersigned switch-based long distance resellers (the "Switch-Based Resellers") respectfully submit their Opposition to the Petitions for Reconsideration, Clarification, and Declaratory Ruling filed by facilities-based long distance carriers WorldCom, Inc., AT&T, Inc., and Global Crossings Telecommunications ("facilities-based IXCs"), in this docket. The Commission requested comment on these Petitions by Public Notice DA 01-1967, published in the Federal Register on Sept. 7, 2001.

Introduction

This opposition principally addresses the proposal of WorldCom, Inc. ("WorldCom") that the Commission declare that a completed 1-8XX call initiated from a payphone be defined as (1) one that is completed to the called party by the facilities-based IXC network, or (2) one that is handed off by a facilities-based IXC to a switch-based reseller, regardless of whether the call is completed.

WorldCom's proposal would change the test for determining whether compensation is due to a payphone service provider ("PSP") from the current test, which is predicated solely on

whether the "call is answered by the called party," to a methodology by which facilities-based IXCs and switch-based resellers, and their respective customers, would be disparately treated. Under WorldCom's proposal, facilities-based IXCs such as WorldCom that carry the call itself without involvement of a switch-based reseller would pay payphone compensation to the PSP only if the call is answered by the called party. Switch-based resellers, however, would be obligated for payphone compensation if a facilities-based IXC delivers the call to a switch-based reseller's switch or platform, regardless of whether the call is answered by the called party or not.[1] WorldCom would pay the payhone compensation to the PSP for both completed and uncompleted calls and[2], then, require reimbursement from the switch-based reseller for the payphone compensation paid to the PSP for both the completed and uncompleted calls, plus the payment of its administrative fee.

WorldCom's proposal is not only contrary to law and this Commission's prior orders but is anti-competitive and anti-consumer. WorldCom's proposal would create an artificial regulatory advantage in the retail long distance market in favor of facilities-based IXCs to the disadvantage of the switch-based resellers and their customers. Such use of regulations to distort free market competitive forces is contrary to the public interest.

WorldCom's proposal:

1. Would define compensable calls to include uncompleted calls, in violation of the payphone statute's express provision that PSPs receive compensation for each and every completed call, 47 U.S.C. 276(b)(1)(A).

[1] WorldCom purports to make an exception to this policy if a switch-based reseller enters into contracts with "all" PSPs for direct payment to the PSP by the switch-based reseller. This is a false exception. There are hundreds of PSPs, and it would impose an onerous burden on switch-based resellers to force them to enter into a contract with every single PSP.

2. Would require this Commission to abandon its prior orders pursuant to which it has defined a completed call as "a call that is answered by the called party" and pursuant to which this Commission has previously determined that uncompleted calls are not compensable.

3. Would subject switch-based resellers to a significant competitive disadvantage in marketing their 1-8XX services, whether subscriber-based or prepaid calling cards, in competition with the same services provided by the facilities-based IXC.

4. Would harm the customers of switch-based resellers by subjecting them to higher rates and charges than those paid for the same services by customers of the facilities-based IXCs and, ultimately, would lead to a substantial reduction in the choices of carriers that customers would have for such services in the marketplace.

5. Incorrectly portrays the facilities-based IXC as being unable to determine call completion for all calls handed to switch-based resellers.

6. Assumes without any evidence that, in those instances in which the facilities-based IXC cannot determine call completion, switch-based resellers will refuse to submit call completion reports in formats reasonably requested by the facilities-based IXC. The

[2] There is also the possibility that the switch-based reseller will be forced to pay WordlCom for calls for which WorldCom has not paid the PSP on the grounds that the call was not completed.

Switch-Based Resellers submit that such recalcitrance would be rare and could justify a switch-based reseller being charged for uncompleted calls.

7. Overlooks the right of facilities-based IXCs to collect reasonable administrative expenses from switch-based resellers in addition to amounts paid directly to PSPs, and the ability of the facilities-based IXC and switch-based reseller to mutually agree to pay for uncompleted calls when call volumes are too low to justify tracking call completion.

In summary, WorldCom, self-servingly, asks this Commission to grant facilities-based carriers a competitive advantage over, and potentially exclude from the market, switch-based resellers in the name of administrative convenience.

Discussion

A. Compensation is Due the Payphone Owner "for Each and Every Completed" Call.

A threshold barrier to WorldCom's Petition is the Telecommunications Act of 1996, which requires the Commission to establish a program so that "all payphone service providers are fairly compensated for each and every completed intrastate and interstate call."[3] The Commission in 1996 defined a "completed call" as a call "that is answered by the called party," and has never deviated from that definition.[4]

Without doubt the Commission's finding that a call is completed when answered by the called party comports with the plain meaning of the word "completed" and therefore is a faithful

[3] 47 U.S.C. Sec. 276(b)(1)(A) (emphasis added)

[4] *Report and Order, Implementation of the Pay Telephone Reclassification and Compensation Provisions of the Telecommunications Act of 1996,* 11 FCC Rcd. 20,541, par. 63 (1996) (subsequent history omitted) ("First Payphone Report and Order")

and accurate execution of the intent of Congress in enacting Section 276. The interpretation also squares with the perception of the consumer who steps into the payphone booth. The payphone consumer does not get charged for uncompleted calls, nor has he or she ever been charged for uncompleted calls even when using a coin, and neither should switch-based resellers.

The same cannot be said for WorldCom's proposed interpretation that deems a call to be complete if delivered to a switch-based reseller. Under this proposal, a call would be deemed complete just because it makes it through some but not all of the switches in the path between the calling party and the called party. Calls dropped by the switch-based reseller or some subsequent carrier, including the terminating local exchange carrier, or that ring unanswered or receive a busy signal, would be labeled "complete" and require compensation. No plain or even strained reading of Section 276 permits this result, which is directly contrary both to the dictionary definition of "completed" and the perception of the consumer standing in the payphone booth who unsuccessfully attempts to place a call.[5]

In the end, whatever technical issues that may exist with regard to determining call completion must be resolved in a manner that is faithful to the payphone compensation statute. As discussed in Point C below, the extent of these difficulties has been exaggerated by WorldCom. Point D below notes several reasonable solutions that switch-based resellers and facilities-based IXCs may agree upon when detection of call completion cannot be done utilizing the switch of the facilities-based IXC alone.

B. WorldCom's Proposal Would Unreasonably and Unfairly Discriminate Between Facilities-Based IXCs and Switch-Based Resellers and Their Respective Customers.

[5] See Webster's 9th Collegiate Dictionary, defining "complete" and "completed" as meaning "to carry out successfully" or "to make whole or perfect".

Payphone compensation is a basic cost of providing 1-8XX services which most, if not all of the interexchange carriers, whether facilities-based IXCs or switch-based resellers, pass on to their customers. Under WorldCom's proposal, a facilities-based IXC marketing its service in the retail market (without switched-based reseller involvement) would set prices to its customers knowing that it need only pay compensation for completed payphone calls. A switch-based reseller marketing its services in the same retail market, however, will have to set prices knowing that it must pay for both completed and uncompleted payphone calls. As a result, the customers of the switch-based resellers will pay higher rates for those services than will the customers of the facilities-based IXCs. Given the competitive advantage which would be bestowed by this Commission upon the facilities-based IXCs if WorldCom's proposal were adopted, the switch-based resellers, in the long term, would not be able to sell and consumers would not be able to receive many of the low-priced products that switch-based resellers currently offer.

Studies conducted by the International Prepaid Communications Association ("IPCA") indicate that approximately 30% of all domestic calls originating on payphones from 800 access services are uncompleted. The international completion rates range from 10% to 60% depending on the called destination. For example, according to the IPCA's studies, completion rates to most African nations are about 10% to 15% with completion rates to South America often as low as 20% to 30%. The adverse, economic effect caused by this Commission requiring compensation for uncompleted calls on switch-based resellers and their customers is apparent and indisputable as is the chilling effect on competition that such a mandate would have.

If switched-based resellers are compelled to pay compensation through the facilities-based IXCs to the PSPs for uncompleted calls, then they, and ultimately the consumer, will be forced to pay much higher costs for 1-8XX services. The consumers, given the relative

economics of such services, will ultimately transition to those services provided by the facilities-based IXCs. The PSPs, which have never been entitled to remuneration for uncompleted calls even when coins are used, will enjoy a substantial windfall. Even the facilities-based carriers will benefit from the windfall by collecting administrative fees permitted by this Commission for uncompleted calls.

It is clear that the imposition of payphone compensation on switch-based resellers for uncompleted calls is not in the public interest. It would neither promote low cost telecommunications services to the consuming public nor would it foster the competitive environment which is necessary to ensure that the public has available to it those services at competitive prices.

C. Facilities-Based IXCs Currently Have, or Have Available to Them, the Requisite Technology to Track Calls to Determine Whether Calls are Completed.

Background on Detection of Call Completion for Calls Involving Switch-Based Resellers

The Switch-Based Resellers have been in the long distance business for many years and collectively provide their customers with both subscriber 1-8XX services and prepaid calling card call services originated from payphones.[6]

A description of the services involved explains why facilities-based IXCs should in most cases be able to determine themselves whether calls from payphones complete to the called party. For subscriber 1-8XX service, the called party is the customer and receives its own toll-

[6] CommuniGroup of K.C., headquartered in Mission, Kansas, has provided long distance service since 1982. CommuniGroup of Jackson is based in Jackson, Mississippi and was founded in 1982. NTS Communications, headquartered in Lubbock, Texas was founded in 1981. Tel-America of Salt Lake City was founded in 1982. Extel d/b/a Express Tel was founded in 1984 and is based in San Diego. National Network Corporation, also founded in the early 1980s, is based in Denver. Telephone Electronics Corporation has direct or indirect investment interests in these companies. It is noted that several of the companies, including NTS Communications, provide subscriber 1-8XX service using their own switch but do not provide prepaid calling card service using their own switch. Several of the companies do use their own switch to provide prepaid calling card service.

free 1-8XX number. When a caller dials that 1-8XX number from a payphone, the originating local exchange carrier routes the call to the facilities-based IXC from which the switch-based reseller is purchasing long distance originating service. The facilities-based IXC then transports the call to the switch-based reseller, which automatically records information to bill the called party and routes the call on to the terminating local exchange carrier.

For prepaid calling card service, the calling party is the customer, and is assigned a PIN and a 1-8XX number that serves as an access code to reach the switch-based reseller. The originating local exchange carrier again routes the call to the facilities-based IXC whose services the switch-based reseller is purchasing. The facilities-based IXC routes the call to the switch-based reseller. The switch-based reseller prompts the calling party to enter a PIN and the number to be called, and then forwards the call on to the terminating local exchange carrier.

For either type of call (and any other type of circuit-switched call), the call setup creates a temporary two-way communication path between the payphone and the telephone of the called party. There is at least one local exchange carrier switch on each end of the switch, and various facilities-based IXC and switch-based reseller switches in the middle.

When in-band analog signaling is utilized, both the signaling information necessary to set-up and release the call and the content of the communications pass over this path. When Signaling System 7 (SS7) technology is utilized, separate paths are created for the signaling information and the call content.

When SS7 technology is present, SS7 standards require that the following signals be sent through the switches in the signaling path to set up a call:

The Initial Address Message ("IAM") is sent in the forward direction to initiate seizure of the outgoing circuit and to transit address and other information related to the routing of the call.

The Address Completed Message ("ACM") is sent in the backwards direction and indicates that all the address signals required for routing the call have been received.

The Answer Message (ANM) is sent in the backwards direction indicating that the call has been answered.

BellCore (now Telcordia Technologies) Notes on the Network, SR 22-75, Section 14.2.3 (December, 1997) (excerpts attached as Exhibit 1).

These messages serve billing as well as call routing purposes and should allow the facilities-based IXC to determine whether the call is answered by the called party. The ANM message specifically is further defined as "a CC7/SS7 signaling message that informs the signaling points involved in a telephone call that the call has been answered and that charging should start." [7] Thus in normal circumstances the ANM message triggers the PSP's right to compensation. The facilities-based IXC commonly uses either the ANM message or (reportedly in some cases) the ACM message to trigger the beginning of billing to the switch-based reseller for wholesale services, and so must be receiving these messages. Thus, where SS7 is utilized throughout the calling path, there should be no difficulty on the part of the facilities-based IXC in determining whether a call completes.

Even where SS7 is not utilized throughout the calling path, the facilities-based IXC should be able to determine whether a call completes if subscriber 1-8XX service is being provided. Industry standards for in-band analog signaling provide for an "Answer (off-hook)" message that is passed back through the calling path to any carrier involved in charging for the call.[8] This signal serves in normal circumstances to trigger the right of the PSP to compensation,

[7] BellCore Notes on the Network, Glossary at 35.

[8] BellCore Notes on the Network, Section 6.5 and Table 6-7.

and also is used by the facilities-based IXC to begin charging the switch-based reseller for wholesale services.

One scenario known to the undersigned carriers in which the ANM and Answer Off-Hook signals are insufficient to indicate call completion occurs when prepaid calling card service is being provided and SS7 is not available through the calling path. In this isolated scenario, depending on the equipment utilized, the prepaid calling card platform may return an ANM signal or the Answer Off-Hook when the calling party reaches that platform -- before the calling party enters the PIN and desired phone number and so before it is known whether the call reaches the called party. Thus, in this limited situation, the facilities-based IXC cannot alone determine call completion. However, the Commission in the *Second Order on Reconsideration* anticipated that facilities-based IXCs would not always be able to determine call completion on their own and so imposed upon them the duty to "to track or arrange for the tracking of" of payphone calls.[9] Here, switch-based resellers that wish to avoid paying for uncompleted calls should be ready and willing to provide facilities-based IXCs with call completion reports needed to help facilities-based IXCs perform their tracking duties.

Call Signaling Information, Including the Answer Message (ANM), is Passed Through the Switches in the Calling Path To the Facilities-Based IXC

WorldCom's petition does not identify specific scenarios in which its switches allegedly have difficulty detecting whether its calls complete. The lack of specificity will complicate the Commission's consideration of this matter.

What WorldCom cannot deny is that its switches are part of the two-way calling path (and separate two-way signaling path in the case of SS7) between the originating local exchange

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[9] 47 CFR Sec. 64.1310(a) (emphasis added); *Second Order on Reconsideration, In the Matter of the Pay Telephone Reclassification and Compensation Provisions*, 16 FCC Rcd. 8098, para. 16 (March 28, 2001) ("Second Order on Reconsideration").

carrier and terminating local exchange carrier. Thus its switches receive the signaling information that is passed through the network, including the Answer Message or Answer Off-Hook message that (outside the prepaid calling card / no-SS7 context) indicates the call has been answered by the called party.

To rebut any contention that the hand-off between the facilities-based IXC and the switch-based reseller is some sort of wall through which the Answer Message or Answer Off-Hook message cannot pass, excerpts from the following industry standards are attached as exhibits:

BellCore/Telcordia Notes on the Network, (1997) (Exhibit 1).[10]

BellCore Technical Reference TR-TSV-000905, (1989) (Exhibit 2) [11]

Having collectively reviewed their network operations in preparing this filing, the Switch-Based Resellers believe the ANM and Answer Off-Hook messages are being properly returned by their equipment to the facilities-based IXC. Other switch-based resellers may be using different equipment that results in difficulties in other circumstances, but no such circumstances are known to the Switch-Based Resellers.

The undersigned carriers note that if WorldCom is not receiving SS7 call set-up signals (ANM and ACM) or Answer-Off Hook signals back from the terminating end of the call, it logically would have no way to begin billing the undersigned carriers for per-minute wholesale

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[10] Section 14.2.3 and Table 14-4 describe how SS7 signaling information flows from the originating LEC end office to the terminating LEC end office and vice versa, both for intraLATA calls and calls involving long distance carriers ("ICs" or interexchange carriers). Sections 6.4 and 6.5 and Table 6-7 describe how the Answer (Off-Hook) signals flows back from the terminating LEC through intermediate switches to all switches involved in charging.

[11] Section 4.1.2 describes how the LEC originating a domestic or international call where SS7 is present sends the Initial Address Message through the switches to the terminating end office, and how the Address Complete Message and Answer Message are sent back to the originating end office. See also Figure 4-1 (signals travel through multiple intermediate networks).

transport services. The undersigned carriers are being billed for the wholesale services and therefore WorldCom must be receiving the signals and know when the calls are completed.

The Commission should reject WorldCom's attempt to use problems experienced in unidentified but narrow situations as an excuse to make all switch-based resellers in all circumstances liable for uncompleted as well as completed payphone calls, while WorldCom when acting as a retailer is liable only for completed calls.

D. Switch-Based Resellers Have Every Incentive to Assist Facilities-Based IXCs in Tracking Whether Calls Complete.

There remains the issue of what to do in those few situations in which the switch of the facilities-based IXC may not be able to tell whether a payphone call completes to the called party. While the industry is still working through this problem, the Commission has already set forth ground rules which if followed by the industry will lead to reasonable solutions.

First, the Commission in the *Second Order on Reconsideration* candidly stated that facilities-based IXCs would need to invest in additional equipment to perform tracking functions, and for that purpose provided a generous transition period.[12] Once the facilities-based IXCs carry out this directive, difficulties they do experience can be expected to diminish.

More importantly, the Commission found that the facilities-based IXCs should make arrangements with switch-based resellers to perform tracking when they could not perform such tracking themselves:

> Our decision here to make the first underlying facilities-based carrier responsible for compensating the PSP is based in large part on the fact that only the first underlying interexchange carrier is reasonably certain to have access to the

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[12] *Second Order on Reconsideration*, para. 20. ("Moreover, we recognized that modifying per-call tracking capabilities may require some new investments by the underlying facilities-based carrier that is responsible for compensating the PSP.")

> information necessary for per-call tracking or to be able to arrange for per call tracking in its arrangements with switch-based resellers that complete the calls. [13]

This Commission implemented this finding up with a rule specifically requiring the facilities-based IXC to "track or arrange for the tracking of" payphone calls.[14]

In fulfilling its duty to make tracking arrangements, facilities-based IXCs will need to work with switch-based resellers on a format for receiving reports concerning call completion.[15] The undersigned switch-based resellers are ready and willing to report this information back to WorldCom and other facilities-based IXCs. Indeed, every switch-based reseller will have an incentive to report back call completion information in some form negotiated with the facilities-based IXC. Unless the switch-based reseller cooperates in providing call completion reports, it will be in no position to criticize the facilities-based IXC for paying the PSP for both completed and uncompleted calls and passing on that charge.[16]

The facilities-based IXCs can and should publicize to the switched-based reseller community the computer format in which they would like to receive these reports. Until they do so the facilities-based IXCs are in no position to speculate that information may be submitted in inconsistent formats.

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[13] *Second Order on Reconsideration*, para. 16 (emphasis added).

[14] 47 CFR Sec. 64.11310(b)

[15] An exception would be if the switch-based reseller and the facilities-based IXC agreed to use call duration as a surrogate for determining whether a call completes. In the absence of such a voluntarily negotiated agreement, however, facilities-based IXCs should not be permitted to insist on surrogates in lieu of reports from switch-based resellers identifying which calls were completed.

[16] Additionally, if a switch-based reseller does not track and report call completions, it will need to count the number of uncompleted calls to make sure that the total number of calls for which it is billed does not exceed the total number of calls (completed and uncompleted). This would impose a substantial burden, as the Switch-Based Resellers normally do not keep information on uncompleted (and therefore unbillable) calls.

The rules adopted in the *Second Order on Reconsideration* permit the switch-based reseller to identify itself as responsible for compensating PSPs. Consequently, many resellers including several of the undersigned carriers are already verifying the PSP's ANIs (Payphone Numbers) against their switch records to ensure that they only pay for those ANIs that were completed for that PSP on their switch. These reports will simply need to be adapted to the format requested by the facilities-based IXC.

Particularly in light of the Commission's decision to give facilities-based IXCs the right to recover from switch-based resellers the costs of tracking calls as well as the actual payments to the PSPs, the argument that tracking calls to completion is too expensive is meritless. In individual cases involving low calling volumes from payphones, switched-based resellers and facilities-based IXCs may agree that it is better to pay for uncompleted as well as completed calls. But the Commission should not allow facilities-based carriers to simply dictate this result. Depending on the equipment involved, there are a number of arrangements that the Commission should declare to be acceptable if offered by the switch-based reseller:

(1) Periodic reporting by the switch-based reseller of the actual number of completed calls. This is the route the undersigned Switch-Based Resellers use today in directly paying PSPs, and should be the preferred route.

(2) Periodic reporting by the switch-based reseller of a percentage factor that approximates the number of completed calls. While not appropriate for switch-based reseller which, like the undersigned carriers, can provide actual call completion records, it may be an option for other switch-based resellers to consider.

(3) Call timing thresholds that declare a call that lasts beyond a certain length of time to be complete. The specific thresholds would be developed from studies

of the typical duration of an uncompleted call. Similarly, while not appropriate for switch-based resellers which can provide actual call completion records, this may also be an option for other switch-based resellers to consider.

The Commission should avoid foreclosing negotiated solutions by declaring that facilities-based IXCs need not arrange for tracking of calls to completion. Rather it should encourage stalled negotiations by reminding all concerned of the duty to negotiate arrangements for the tracking of payphone calls to completion. In this regard it must be noted that WorldCom is insisting in negotiations with the Switch-Based Resellers that it has the unilateral right to refuse to track calls and deem every call delivered to a reseller's switch to be complete.

E. Other Issues.

Global Crossings has asked that the Commission ban agreements between PSPs and switch-based resellers for direct payment to the PSP. Such a rule would unduly interfere with mutually acceptable market-based solutions and increase the leverage facilities-based IXCs already have over switch-based resellers. Moreover, once a PSP and a switch-based reseller reach agreement for compensation, the payphone calls involved are no longer uncompensated and so are outside the scope of the Commission's payphone compensation rules. [17]

AT&T and WorldCom have asked for relaxation of the level of detail by which they must track payphone calls. Until the facilities-based IXCs publish reasonable specifications for call completion reports from resellers, it will not be known what detail will be needed for the facilities-based carriers to process the call completion reports. Thus the Commission should require the facilities-based IXCs to spell out exactly what information they need in call completion reports from switch-based resellers before considering a grant of relief from the reporting requirements currently imposed on the facilities-based IXCs.

[17] *See First Payphone Report and Order*, para. 21 and 64.

Conclusion

For the reasons described herein, the Commission should deny the Petitions for Reconsideration, Declaratory Ruling, and Clarification filed by WorldCom, AT&T and Global Crossings.

Respectfully submitted

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Certificate of Service

The undersigned hereby certifies that on this 9th day of October, 2001, he sent the forgoing by first-class U.S. mail, postage-prepaid to the following:

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Bellcore

SPECIAL REPORT
SR-2275
ISSUE 3, DECEMBER 1997

Bellcore Notes on the Networks

6.4 Interoffice In-Band Analog Signaling

This section describes in-band analog interoffice signaling for operator and customer call setup.

The use of circuit-associated interoffice in-band analog signaling call-completion and call-supervision methods and techniques covered in Sections 6.5 and 6.6 have almost become obsolete in modern LEC interoffice networks. Their use has been replaced by Common Channel Signaling (CCS) methods described in Section 6.23. In general, in-band analog signaling call-supervision methods are encountered only in special applications, such as operator system trunks, E911 trunks, and busy-verification trunks. In addition, the physical dc-signaling interfaces described in Sections 6.7 through 6.9 are also almost non-existent in modern LEC interoffice networks. They have been replaced by direct digital interfaces to switching systems and other network elements. In general, the dc-signaling physical interfaces will only be encountered on connections to small step-by-step switching systems that may still be present in LEC networks. The ac call-progress signals (such as line busy signals) are still used, but in most cases, they are applied by the originating office rather than traversing the interoffice network from the terminating office.

The names given for the various signals (see Table 6-6) are those that are well established by general use. A few alternative terms having considerable use are shown in parentheses in the table. The direction of each signal, the indication given to the customer or operator, and the on- or off-hook classification of the signal are shown where applicable.

Table 6-6. Signals Required in Dialing Through the Network

Name of Signal	Direction: On-Hook	Direction: Off-Hook	Direction: Calling End	Direction: Called End	Use or Meaning	Indication: To Customer	Indication: To Operator	See Note
Connect (Seizure)		√		→	Requests service and holds connection			
Dial Tone			←		Equipment ready for dialing	Steady tone	Steady tone	
Disconnect	√			→	No service desired Message completed Release connection		Calling supervisory lamp lighted	
Answer (Off-Hook)		√	←		Called party answered. Charge timing begins and depends on this signal.		Called supervisory lamp dark	
Hang Up	√		←		Called party releases. Message completed			
Delay-Dial (Delay Pulsing)		√	←		Called end not ready for digits		Start-dial or KP forward lamp dark	
Wink		√	←		Called end not ready for digits		Start-dial or KP forward lamp dark	
Start-Dial (Start Pulsing)	√		←		Called end ready for digits		Start-dial or KP forward lamp lighted	
Dial Pulsing (DP)	√	√	↔		Indicates called number			
Dual-Tone Multifrequency Pulsing			→		Indicates called number			
Multifrequency Pulsing (MF) Keypulse (KP)			→		Prepares receiver for digits			
Digits			→		Indicates called number			
Start (ST)			→		Indicates that all necessary digits have been sent			
Start Identification (Automatic Number Identification (ANI))		√	←		Indicates that Centralized Automatic Message Accounting (CAMA) sender is ready to receive calling number			
ANI Outpulsing Keypulse (KP)			→		Prepares CAMA sender for digits			
Identification Digits			→		Indicates if service-observed, whether identification is automatic or operator, ANI failure, hotel/motel, mobile, coinless public telephone, etc.			
Digits			→		Indicates calling number, if sent			1
Start Pulse			→		Indicates all digits sent			
Line-Busy Tone			←		Called line busy	60-Interruptions per min (IPM)	60-IPM tone	
Reorder Tone and No Circuit (All Trunks Busy)			←		All paths busy All trunks busy Blockage in equipment Incomplete registration of digits	120-IPM tone	120-IPM tone	2
Ringing			→		Alerts called customer to incoming call	Bell rings or other alerting signal		3

6.5 On- and Off-Hook Signals

A number of interoffice signals are classified as on-hook, off-hook, or a sequential combination of the two. The terms were derived from the position of an early telephone receiver in relation to the mounting (hook) provided for it. If the station is on-hook, the conductor loop between the station and end central office is open and no current is flowing. For the off-hook condition, there is a dc shunt across the line and current is flowing in the loop. For more information on interoffice signaling see GR-506-CORE, *LSSGR: Signaling for Analog Interfaces*.

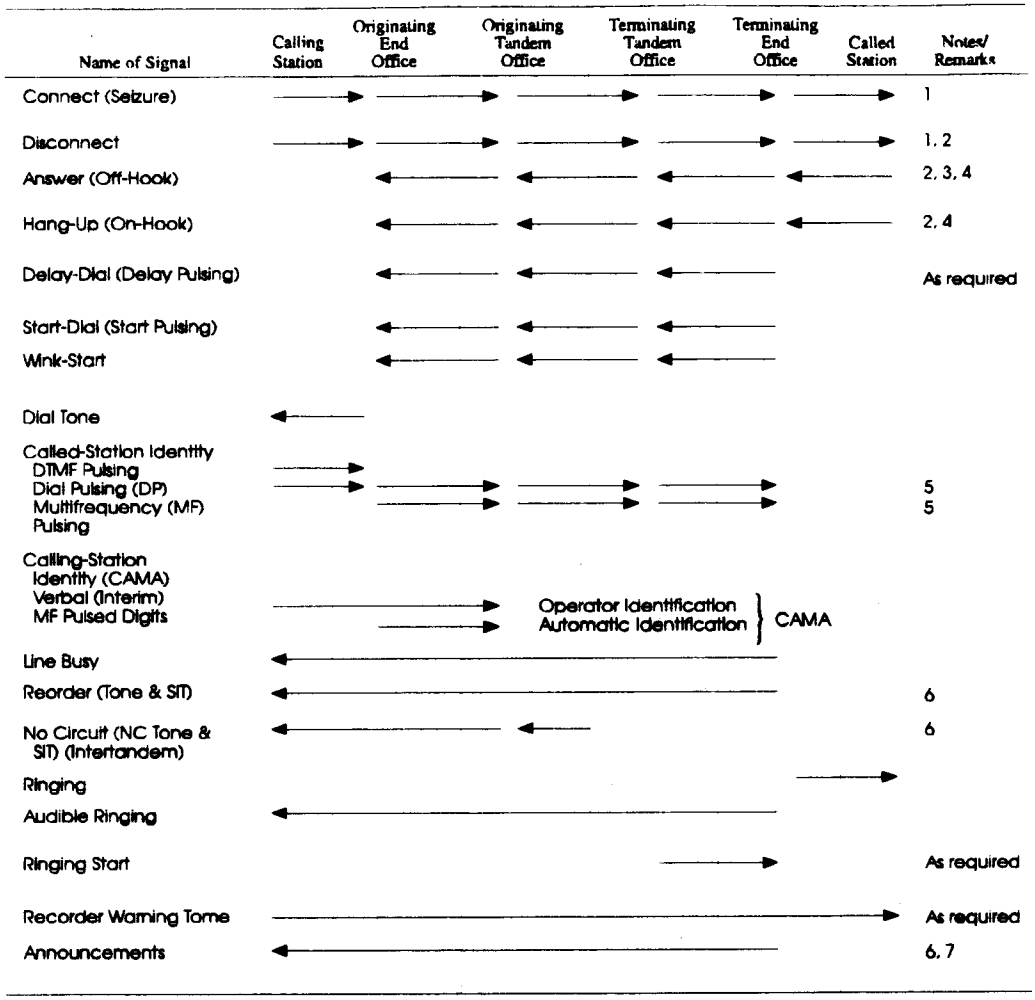
These terms are also convenient to designate the two signaling conditions of a trunk. Usually, if a trunk is not in use, the offices at both ends are sending an on-hook signal. Seizure of the trunk at the calling end sends an off-hook signal toward the called end. If a trunk is awaiting an answer from the called end, the called end is signaling on-hook toward the calling end. Answer of the call sends an off-hook signal back toward the calling end. However, one-way trunks using delay-dial operation with loop reverse-battery signaling can send off-hook toward the originating office when idle.

Both off- and on-hook signals, when not used to convey address information, are often referred to as supervisory signals or simply as *supervision*. A sequence of alternating on- and off-hook signals (dial pulses) occurring within a specific time duration may be used to convey address information.

The various on- or off-hook signals are shown in Table 6-6. The direction of transmission of each signal is also shown. The following factors help in determining the significance of a signal in addition to information in the table.

- Duration — The on-hook interval of a dial pulse is shorter than an on-hook disconnect signal transmitted in the same direction.
- Relative time of occurrence — A delay-dial, off-hook signal occurs before any digits have been sent, while the answer off-hook signal occurs after all digits have been sent. Although both signals are transmitted in the same direction and both are off-hook, they are distinguished by the relative time of their occurrence.

Table 6-7. Signals Used in Dialing Through the Network



Note 1. — In ground-start operation, the connect and disconnect signals extend to the called station. In loop-start, these signals extend only to the terminating end office.

Note 2. — This signal is relayed from office to office.

Note 3. — Used in charging control.

Note 4. — Answer supervision must be returned to the office where charging is located. It is desirable to return real or simulated answer supervision to the originating office in all cases.

Note 5. — Connection must be established before remaining or regenerated digits are sent ahead.

Note 6. — May originate at any one of the indicated offices.

Note 7. — Announcement may be by machine (recorded announcement) or operator.

6.5.1 Connect (Seizure)

A connect signal is a sustained off-hook signal sent toward the called end of a trunk following its seizure. This signal is the means by which the calling end requests service. The signal continues as long as the connection is held. Momentary interruptions in the connect signal caused by dial pulses are ignored as far as the connect and disconnect functions are concerned. To avoid double seizures (that is, simultaneous seizure from both ends), a connect signal must be sent immediately upon seizure of a 2-way trunk to make it busy at the other end. Simultaneous seizure of a 2-way trunk from both ends is called *glare.*

6.5.2 Answer (Off-Hook)

6.5.2.1 Charge Delay

When the called customer answers, an off-hook signal is sent toward the calling end to the office where automatic charging takes place. For charging purposes, the answer off-hook signal is distinguished from off-hook signals of shorter duration by the requirement that it be continuous for a minimum interval ranging from 2 to 5 seconds. The minimum value stated in the *LSSGR* for an off-hook signal that should be recognized as an answer signal for charging and supervision purposes is 2 seconds.

Most trunks when idle, and all trunks when awaiting the customer's answer, transmit an on-hook signal from the called end to the calling end. Most trunks return to the on-hook state when the called station hangs up.

6.5.2.2 Answer Signals on Calls to Directory Assistance

To provide proper billing, answer supervision should be returned on all 555-1212 and NPA + 555-1212 calls for direct-dialed directory assistance. Where operator directory assistance (131) trunks are used jointly to complete customer-dialed 555 calls and operator-placed 131 calls, they should be arranged to return answer supervision. Where the 131 trunks handle only operator-dialed traffic, the return of answer supervision is optional.

6.5.2.3 Cross-Office Transfer Time for Answer Signals

Since individual switching offices contribute directly to network effects, it is important to establish performance objectives that recognize those parameters to which the network is most sensitive. Cross-office delay in transfer of the answer signal is one such parameter. Long-term priorities seek to avoid loss of revenue attributable to slow transfer of the answer signal that governs the start of charging.

Return of an answer signal should be performed with dispatch. Figures ranging from 5 to 25 ms are being achieved and are preferred. In the absence of economic options to achieve higher speeds, figures on the order of 50 ms (average) for normal tandem offices appear acceptable.

6.5.3 Control of Disconnect

6.5.3.1 Calling-Customer Control of Disconnect

Calling-customer control of disconnect, also known as forward control of disconnect, forward disconnect, or calling-party control, is the means by which the calling end notifies the called end that the established connection is no longer needed and should be released. Forward disconnect is an on-hook signal sent toward the called end. As long as the customer remains off-hook, the connection will remain up. When the calling customer goes on-hook for a period longer than the disconnect time, the connection is released. This allows the caller to disconnect at any time by hanging up.

To distinguish an on-hook signal intended as a disconnect signal from other on-hook signal indications, the forward disconnect signal should exceed about 150 to 400 ms. To ensure that ring-forward signals do not cause false disconnects, incoming trunk equipment to operators must not release during a minimum on-hook interval of 140 ms (a maximum 130-ms ring-forward pulse plus a 10-ms safety margin). In general, any trunk circuit connected to inband signaling equipment must also be arranged so that it will not release during an on-hook interval of less than 140 ms.

Calling-customer control is usually modified by the end office to prevent connecting the called party to dial tone as soon as the caller goes on-hook, and to prevent locking the caller to the connection as long as the caller is off-hook. Table 6-8 lists disconnect timing that occurs in various telephone connections when the calling party hangs up and the called party remains off-hook, and when the called party hangs up and the caller remains off-hook.

Calling-customer control of disconnect is also modified by the Automatic Message Accounting (AMA) location (local AMA, Centralized Automatic Message Accounting [CAMA], OSPS or TOPS system) and by some tandem switching systems. If the called party goes on-hook for a period of time, after at least 2 seconds of answer, a timed disconnect will occur. Current arrangements for Local Automatic Message Accounting (LAMA), CAMA, operator-services systems, and some tandem switching systems require an on-hook from the called party of 10 to 12 seconds to cause a timed disconnect.

- Circuit Validation Test (CVT) — ensures that two exchanges have sufficient and consistent translation data for placing a call on a specific circuit of an interexchange circuit group.

More details on the SS7 protocol can be found in Section 6 of this document and in GR-246-CORE.

14.2.3 CCS Call Setup

An example of basic intraLATA Plain Old Telephone Service (POTS) call setup using CCS is described in this section along with additional information on interLATA and ISDN calls.

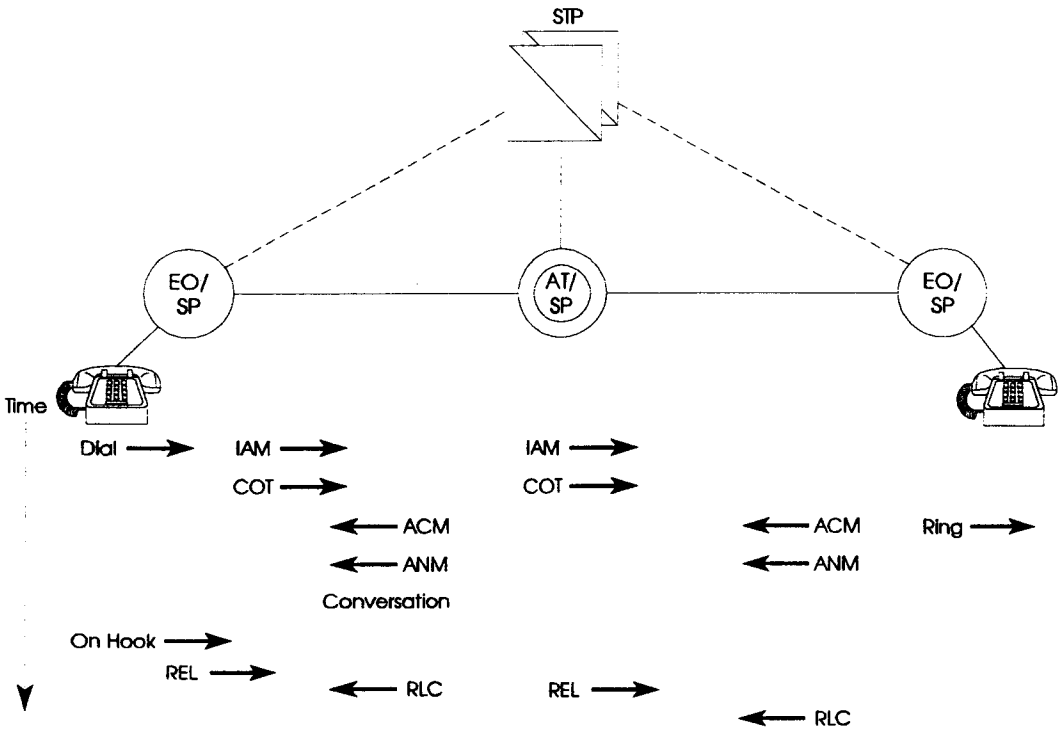
The ISDNUP portion of the SS7 protocol is used to support call setup. The Initial Address Message (IAM) is a mandatory message sent in the forward direction to initiate seizure of an outgoing circuit and to transmit address and other information relating to the routing and handling of a call. The Address Complete Message (ACM) is a message sent in the backward direction indicating that all the address signals required for routing the call to the called party have been received. The Answer Message (ANM) is a message sent in the backward direction indicating that the call has been answered. The Release Message (REL) is a message sent in either direction indicating that the circuit identified in the message is being released due to the reason (cause) supplied and is ready to be put in the idle state on receipt of the Release Complete Message (RLC). The RLC is a message sent in either direction in response to the receipt of an REL.

The following is a description of how these messages are used for setup of an intraLATA interoffice call. This call scenario is for an intraLATA call switched through an Access Tandem (AT) where a Continuity Check Message (COT) is required. Refer to Figure 14-4 for a diagram of the scenario.

When the customer dials an intraLATA interoffice call, the originating office sends an IAM over the SS7 signaling link to the AT via the STP pair. The AT then sends an IAM to the terminating office indicating the circuit to be used for the call between the AT and the terminating office. When the terminating office receives the IAM and the COT, it sends an ACM to the AT and applies power ringing to the called party's line. When the AT receives the ACM, it sends an ACM to the originating end office. When the called party goes off-hook, an ANM is sent from the terminating end office to the AT. When the AT receives the ANM, it sends an ANM to the originating end office. After the calling and called party finish their conversation, one party will go on-hook. If the calling party goes on-hook, the originating end office sends an REL to the AT. When the access tandem receives the REL, it sends an RLC to the originating office, and sends an REL to the terminating office. When the terminating office receives the REL, it sends an RLC to the AT.

CCS based POTS call set-up to ICs uses the same switch- to-switch message flow as described above for an intraLATA call. For calls routed to ICs, however, additional

optional parameters may be included in the IAM depending on which IC has been selected. Examples of these additional optional parameters include Charge Number (containing Automatic Number Identification [ANI]), Carrier Identification Parameter (containing the 3- or 4-digit carrier identification code for the call), and Calling Party Number (CPN).



Legend:

ACM	=	Address Complete Message
ANM	=	Answer Message
AT	=	Access Tandem
COT	=	Continuity Check Message
EO	=	End Office
IAM	=	Initial Address Message
REL	=	Release Message
RLC	=	Release Complete Message
SP	=	Signaling Point
STP	=	Signaling Transfer Point

Figure 14-4. CCS IntraLATA Call Setup

ISDN call set-up is basically the same, from a message flow standpoint, as POTS call set-up. The key differences are in the bearer capabilities that can be requested (such as 64 clear channel) and additional information that can be sent as part of call set-up (such as high-layer and low-layer compatibility).

More information on CCS call setup can be found in GR-317-CORE, *Switching System Generic Requirements for Call Control Using the Integrated Services Digital Network User Part (ISDNUP)*; GR-394-CORE, *Switching System Generic Requirements for Interexchange Carrier Interconnection Using the Integrated Services Digital Network User Part (ISDNUP)*; TR-NWT-000444, *Switching System Generic Requirements Supporting ISDN Access Using the ISDN User Part*; and GR-905-CORE, *Common Channel Signaling (CCS) Network Interface Specification (CCSNIS) Supporting Network Interconnection, Message Transfer Part (MTP), and Integrated Services Digital Network User Part (ISDNUP).* Descriptions of CCS-based services such as CLASS service, ISDN, ABS, 800 Data Base Service, AIN, and ISCP, and examples of call processing for those services will be given in Sections 14.3 through 14.9.

Acronyms

AABS	Automated Alternate Billing Service
AAL	Asynchronous Transfer Mode (ATM) Adaptation Layer
AAP	Alternate Access Provider
ABD	Average Business Day
ABL	Area Business Listing
ABR	Available Bit Rate
ABS	Alternate Billing Service
AC	Access Concentrator or Automatic Callback
ACC	Automatic Congestion Control
ACD	Automatic Call Distributor
ACM	Address Complete Message
ACNA	Automated Customer Name and Address
ACO	Additional Call Offering
ACR	Automatic Call Rejection
ACTS	Automated Coin Toll Service
ADM	Add-Drop Multiplexer
ADPCM	Adaptive Differential Pulse-Code Modulation
ADSI	Analog Display Services Interface
ADSL	Asymmetrical Digital Subscriber Line
AFR	Automatic Flexible Routing
AIC	Automatic Intercept Center
AIN	Advanced Intelligent Network
AINI	ATM Inter Network Interface
AIOD	Automatic Identified Outward Dialing
AIS	Alarm Indication Signal or Automatic Intercept System
ALC	Analog Loop Carrier
A-Link	Access Link
AMA	Automatic Message Accounting
AMADNS	AMA Data Networking System
AMAT	AMA Transmitter

AMATPS	AMA Teleprocessing System
AMI	Alternate Mark Inversion
AML	Actual Measured Loss
AMPS	Advanced Mobile Phone Service
AMS	Audiovisual Multimedia Service
ANI	Automatic Number Identification
ANM	Answer Message
ANSI	American National Standards Institute
AOCR	Automatic Out-Of-Chain Reroute
AOX	Automated Optical Cross-connect
APC	Automatic Power Control
APP	Application date
APS	Administrative Processor System or Automatic Protection Switching
APT	Automatic Progression Trunk
AR	Automatic Recall
ARP	Address Resolution Protocol
ARS	Automatic Route Selection
ARSB	Automatic Repair Service Bureau
ASCII	American Standard Code for Information Interexchange
ASCX12	Accredited Standards Committee X12 (ANSI)
ASN.1	Abstract Syntax Notation One
ASR	Access Service Request or Automatic Speech Recognition
ASU	Automatic Service Unit
AT	Access Tandem
ATA	Automatic Trouble Analysis
ATIS	Alliance for Telecommunications Industry Solutions (formerly ECSA)
ATM	Asynchronous Transfer Mode or Automated Teller Machine
ATRS	Automatic Trouble Reporting System
ATT	Automatic Trunk Testing
AVD	Alternate Voice/Data
B8ZS	Bipolar with 8-Zero Substitution

HD-FDF	High-Density Fiber Distributing Frame
HDLC	High-Level Data Link Control
HDSL	High bit-rate Digital Subscriber Line
HDT	Host Digital Terminal
HEC	Header Error Control
HLSC	High-Level Service Circuit
HLR	Home Location Register
HNPA	Home Numbering Plan Area
HRC	Hypothetical Reference Connection
HTR	Hard-To-Reach
HTU	High bit-rate Transmission Unit
IAL	Immediate-Action Limit
IAM	Initial Address Message
IC	Intercept or Interexchange Carrier
ICCF	Industry Carriers Compatibility Forum
ICH	Interprocessor Communication Handler
ICI	Inter-Carrier Interface
ICL	Inserted Connection Loss
ICSC	Interexchange Carrier Service Center
ICT	Incoming Trunk
ICUP	Individual Circuit Usage and PEG
IDDD	International Direct Distance Dialing
IDF	Intermediate Distributing Frame
IDLC	Integrated Digital Loop Carrier
IDN	International Data Number
IDOC	Internal Dynamic Overload Control
IDT	Integrated Digital Terminal
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
IF	Identification Failure
IILC	Information Industry Liaison Committee
IITC	Internetwork Interoperability Test Committee
IITP	Internetwork Interoperability Test Plan

Definitions

2-way trunk. A trunk that can be seized at either end.

4-wire circuit. A circuit using two 1-way transmission paths, one for each direction of transmission. It may be two pairs (four wires) of metallic conductors or equivalent 4-wire as in a carrier system.

A-Link/Access Link. A CCS/SS7 signaling link used to connect a Signaling End Point (SEP) and its home pair of STPs.

Access charge. A charge imposed by applicable access tariffs that compensates the BOC for the provision of connections between end users and interexchange carrier or other access customers via LEC-provided facilities.

Access tandem. A LEC switching system that provides traffic concentration and distribution functions for interLATA traffic originating/terminating within a LATA. The access tandem provides the interexchange carrier with access to more than one end office within the LATA. More than one access tandem may be required to provide access to all end offices within a LATA.

Address Complete Message (ACM). A CCS/SS7 signaling message that contains call-status information. This message is sent prior to the called customer's going off-hook.

Address signals. Address signals provide information to the system concerning the desired destination of the call. This is usually the dialed digits of the called telephone number or access codes. Typical types of address signals are DP, DTMF, and MF.

Adjacent signaling points. Two CCS/SS7 signaling points that are directly interconnected by signaling links.

Alarm Indication Signal (AIS). A signal that replaces the normal traffic signal when a maintenance alarm indication has been activated.

Alerting signals. Alerting signals (for example, ringing, receiver off-hook) are transmitted over the loop to notify the customer of some activity on the line.

Alternate route. A second or subsequent choice path between two points, usually consisting of two or more trunk groups in tandem. This term (or alternate routing) is also used as a verb to define the act of selecting an alternate route.

Alternate route network. A network that includes both high-usage trunk groups and final trunk groups.

Alternate routing. The feature of a switching system by which a call, after encountering an "all trunks busy" (which is usually referred to as a "no circuit" or NC condition), in the first choice route, is offered to another route to or toward its destination.

Alternate Voice/Data (AVD). A feature of CSDC that allows a user to alternately transmit 56 kbps digital data or analog voice over the same subscriber line (but not simultaneously). AVD is currently a feature intended only for intraLATA service.

Analog signal. A signal that varies in a continuous manner, such as voice or music. An analog signal may be contrasted with a digital signal which can assume only discrete values. Signals generated by a data set can be analog or digital.

Anonymous Telephone Number. A telephone number that should not be displayed or voiced back to the called party. Such a designation is stored in switch memory and is included in signaling information sent to the terminating switch for interSPCS calls.

Answer Message (ANM). A CCS/SS7 signaling message that informs the signaling points involved in a telephone call that the call has been answered and that call charging should start.

Automatic identification on outward dialing. The ability of some central office equipment devices to provide an itemized breakdown of charges (including individual charges for toll calls) for calls made by each CPE telephone extension.

Automatic Intercept Center (AIC). The centrally located set of equipment that is part of an Automatic Intercept System (AIS) that automatically advises the calling customer, by means of either recorded or electronically assembled announcements, of the prevailing situation that prevents completion of connection to the called number.

Automatic Message Accounting (AMA). The automatic collection, recording, and processing of information relating to calls for billing purposes. (See CAMA also.)

Automatic Number Identification (ANI). The automatic identification of the calling station.

Auxiliary service trunk groups. A category of trunk groups that provides selected services for customers or operators and terminates at announcement systems, switchboards, or desks. Typical applications commonly employ the following types of trunk groups:

- Directory Assistance
- Intercept
- Public Announcement
- Repair Service
- Time
- Weather.

Available state. An available circuit state occurs when all of the following are true:

1. The Bit Error Ratio (BER) is better than 1 in 10 to the *n*th power for a specific number of consecutive observation periods of fixed duration.

Signaling Point (SP). A node in a CCS/SS7 signaling network that either originates and receives signaling messages, or transfers signaling messages from one signaling link to another, or both.

Signaling point code. A binary code uniquely identifying a CCS/SS7 signaling point in a signaling network. This code is used, according to its position in the label, either as destination point code or as originating point code.

Signaling Point Interface (SPOI). The demarcation point on the SS7 signaling link between a LEC network and a Wireless Services Provider (WSP) network. The point establishes the technical interface and can designate the test point and operational division of responsibility for the signaling.

Signaling System 7 (SS7). An internationally standardized, general-purpose CCS protocol.

Signaling Transfer Point (STP). A signaling point with the function of transferring signaling messages from one signaling link to another and considered exclusively from the viewpoint of the transfer.

Slip-controlled. The occurrence at the receiving terminal of a replication or deletion of the information bits in a frame.

Slip-uncontrolled. The loss or gain of a digit position of a set of consecutive digit positions in a digital signal resulting from an aberration of the timing processes associated with the transmission or switching of the digital signal. The magnitude or the instant of the loss or gain is not controlled.

Source/sink device. A source/sink device is byte-synchronous with a byte orientation. Source devices originate; sink devices terminate.

Special routing code. A 3-digit code in the form 0XX and 1XX available for use within a network used to modify routing or call-handling logic. End users are prevented from using system codes by the arrangement of the switching equipment to block all customer-dialed calls with a 0 or a 1 in the fourth digit of a 10-digit all, as well as 7-digit calls with a 0 or 1 in the first digit.

Statistical multiplexing. A multiplexing technique that differs from simple multiplexing in that the share of the available transmission bandwidth allocated to a given user varies dynamically.

Stored Program Control System (SPCS). An automatic switching system in which system operations are controlled by a stored program executed by one or more processors. Operation of the system can be altered significantly by changing programs.

Superframe format. The superframe transmission structure consists of 12 DS1 frames (2316 bits). The DS1 frame comprises 193 bit positions, the first of which is the frame overhead-bit position. Frame overhead bit positions are used for frame and signaling phase alignment only.

Bellcore Document
Technical Reference
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Common Channel Signaling(CCS) Network Interface Specification

1. INTRODUCTION

1.1 General

This document specifies the required interfaces between the out-of-band Common Channel Signaling (CCS) architectures utilizing the Signaling System Number 7 (SS7) protocol[1] deployed by the Bellcore Client Company (BCC) networks and other Interconnecting Networks (ICNs). These ICNs include Interexchange Carriers (ICs), International Carriers (INCs), Exchange Carriers, and Enhanced Service Providers (ESPs). The primary audience of this document is the ICNs. The information is therefore focused on ICN needs[2]. It is important to note the difference between this specification and other requirements documents. Other requirements address individual network elements and focus on the information needs of vendors who develop those elements. Familiarity with related requirements documents will be helpful in reading this document. Several are listed at the end of this section.

1.2 Purpose

This document provides the ICNs with compatibility information required for interconnecting with the BCC networks. This includes the interface architecture, interface protocol, messages, signals, conditions, and events that occur for exchange of information between networks. Also described are the physical interconnection requirements, capabilities affecting the interface, performance objectives/requirements and interface provisioning, operations, and maintenance. Methods for measurement and accounting of the BCC CCS network use by other networks are described.

The exchange of information between networks relates to call control applications for this first issue of the document only. This information will be updated periodically with the evolution of supported capabilities.

1.3 Organization of the Document

This interface specification consists of eight sections:

Section 1 provides the introduction, including the intended audience, the purpose, and the organization of the document.

Section 2 describes the CCS network interconnection architecture. It includes the network architecture and the protocol architecture. The network architecture section describes the two types of signaling interface architectures considered (both of which are non-associated):

- BCC Signaling Transfer Points (STPs) to ICN STPs
- BCC STPs to ICN Signaling Points (SPs)[3].

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1. It is required that the North American version of Signaling System Number 7 as specified by ANSI standards[1] is used.
2. Refer to the disclaimer in front of the document.
3. Signaling Points (SPs), as used in this document, consist of switches, operator service systems, or service control points, capable of signaling for call control and relevant communications with other nodes using the SS7 protocol. SPs include all signaling nodes other than STPs.

customer located in World Zone 1 outside the contiguous United States.

- Consolidated Carrier

  This is a carrier that provides connections as described in both the above.

- Independent Exchange Carrier

  This is a non-BCC Local Exchange Carrier.

- Enhanced Service Provider.

4.1.2 Internetwork Call Control Messages and Flows

This section describes the messages that flow between networks in order to setup a call between two end users. It considers a typical scenario with SS7 within all networks including an originating network, an ICN network and a terminating network. Possible variations of this call setup and release scenario are also described.

The following ISDN User Part messages are used for call setup and release:

- Initial Address Message (IAM): The IAM is sent in a forward direction to initiate trunk set up with the busying of an outgoing trunk and carries the information about that trunk along with other information relating to the routing and handling of the call to the next switch.
- Continuity (COT) Message: The COT message is sent in the forward direction to indicate a success or failure of the continuity check performed on a circuit.
- Address Complete Message (ACM): The ACM is sent in the backward direction from a terminating end office when the called party information is complete and any continuity checks required in the connection are successful.
- Answer Message (ANM): The ANM is sent in the backward direction to indicate that the call has been answered.
- Release Message (REL): The REL message is sent in either direction to indicate that the specified circuit is being released.
- Release Complete Message (RLC): The RLC message is sent in either direction as a response to an REL message. The RLC message idles a circuit for use on the next call.
- Suspend (SUS) Message: The SUS message is sent in the backward direction to indicate that the called party went on-hook before receipt of a Release message.
- Resume (RES) Message: The RES message is sent in the backward direction after an SUS has been sent, to indicate that the called party has reconnected.

After an end user has dialed a required number of digits for a domestic or an international call, an end office has enough information to formulate an Initial Address Message (IAM) to initiate signaling for trunk setup. The IAM marks a circuit, indicated by the Circuit Identification Code (CIC) in the IAM, busy and carries that information to the next switch. The IAM contains the Originating Point Code (OPC), Destination Point Code (DPC), Signaling Link Selection (SLS), and CIC along with other parameters shown in Table A-20 in Appendix A. For a given OPC and DPC, the CIC uniquely identifies an SS7-supported circuit. The IAM also carries an indication to notify the next switch whether or not a continuity check is required. If required, continuity check procedures as described in Section 5 are performed. After the continuity check is completed, a Continuity (COT) message is sent in the forward direction and a trunk is setup. The IAM progresses switch-to-switch via the STPs to the terminating switch. At this point, if the terminating line is idle, an audible ring is provided to the calling party by the terminating switch which also returns an

Address Complete Message (ACM) to the originating end office. However, if the terminating line is busy, the terminating switch returns a Release (REL) message with a cause indicating the line busy releasing the intermediate trunks. (See Section 4.1.2.1). Assuming the terminating line is free and the call is answered, the answer supervision is sent in the backward direction by an Answer Message (ANM). At this time the call is established and the conversation begins.

After the conversation is finished, the call can be disconnected with procedures depending upon who hangs up first, the calling party or the called party. If the calling party hangs up first, an REL is sent in the forward direction, from the calling end to the called switch. The individual segments of the circuit, i.e., trunks are released. A Release Complete (RLC) message is sent, switch-to-switch, in the reverse direction to indicate the idling of the trunks and the availability of the trunks for next call.

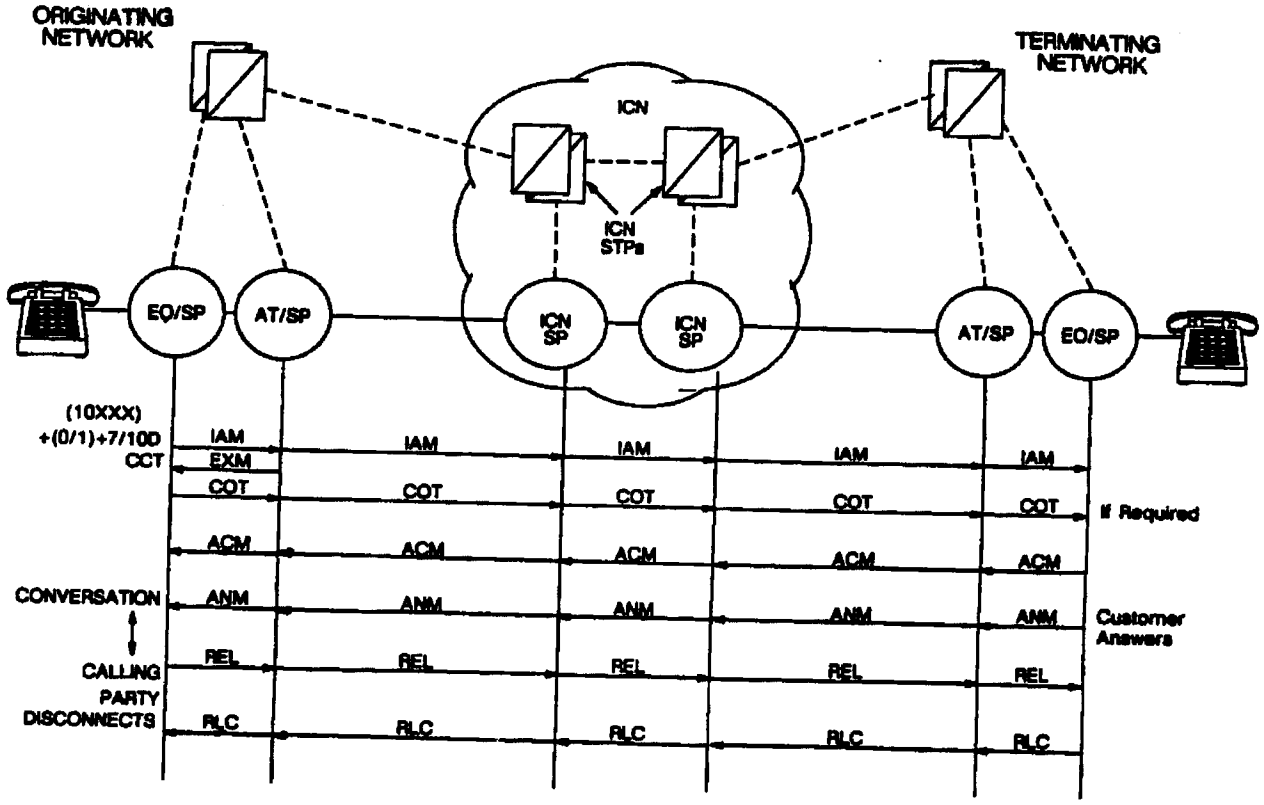
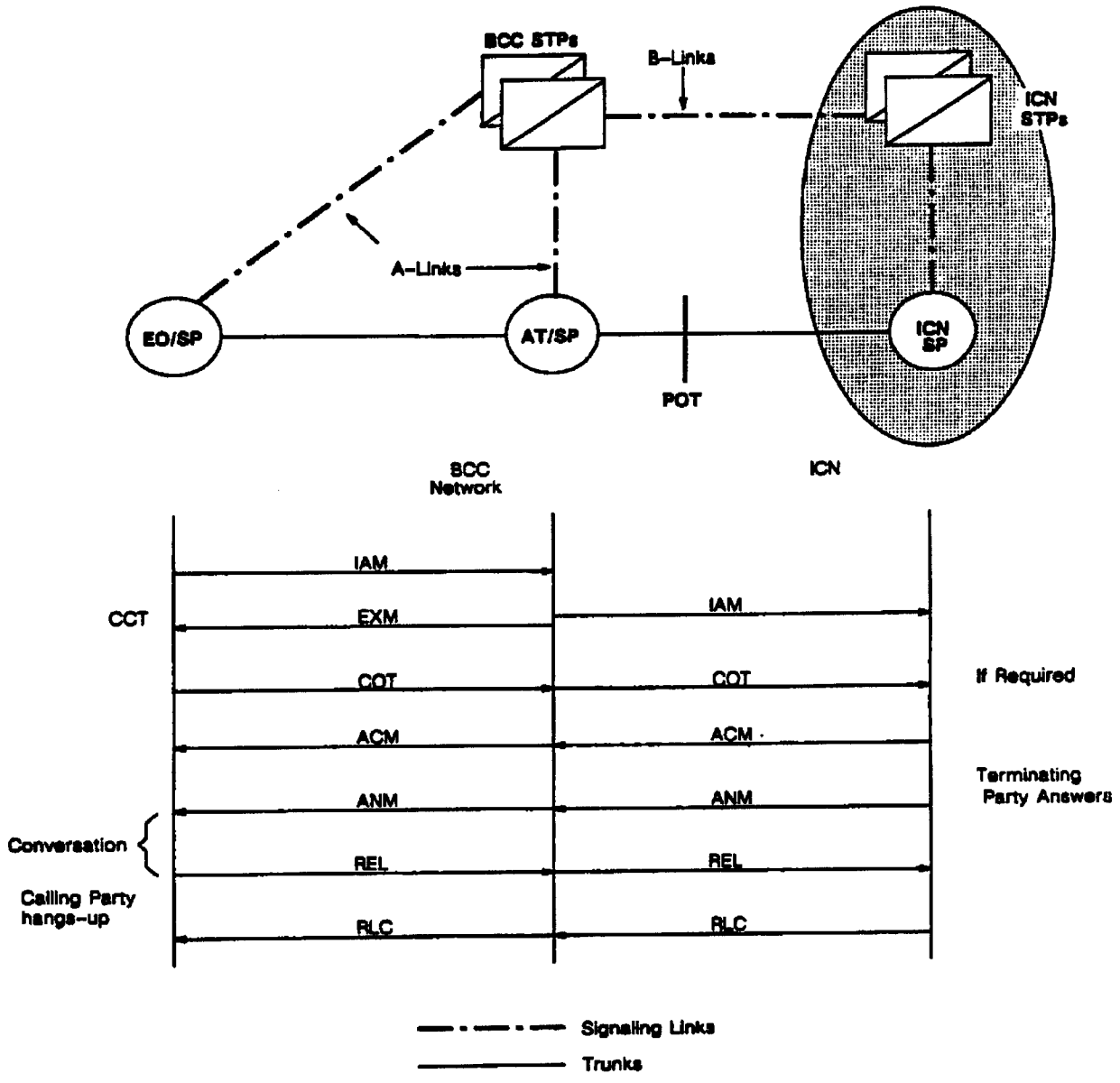


Figure 4-1. Typical Call Setup and Release



Note: Signaling link redundancies are not shown, but are required.

Figure 4-4. Originating Call Control Access: Via Access Tandem - All SS7