RUTLEDGE, ECENIA, PURNELL & HOFFMAN

PROFESSIONAL ASSOCIATION
ATTORNEYS AND COUNSELORS AT LAW

STEPHEN A. ECENIA
KENNETH A. HOFFMAN
THOMAS W. KONRAD
MICHAEL G. MAIDA
MARTIN P. McDONNELL
J. STEPHEN MENTON

POST OFFICE BOX 551, 32302-0551
215 SOUTH MONROE STREET, SUITE 420
TALLAHASSEE, FLORIDA 32301-1841

TELEPHONE (850) 681-6788
TELECOPIER (850) 681-6515

R. DAVID PRESCOTT
HAROLD F. X. PURNELL
MARSHA E RULE
GARY R RUTLEDGE

GOVERNMENTAL CONSULTANTS

MARGARET A MENDUNI
M. LANE STEPHENS

July 1, 2002

Ms. Blanca Bayo, Director
Commission Clerk and Administrative Services
Florida Public Service Commission
2540 Shumard Oak Boulevard, Room 110
Betty Easley Conference Center
Tallahassee, FL 32399-0850

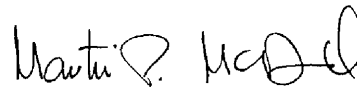**VIA HAND DELIVERY**

Re: Docket No. 020129-TP

Dear Ms. Bayo:

Enclosed herewith for filing in the above-referenced docket on behalf of ITC^DeltaCom Communications ("ITC^DeltaCom") are the original and fifteen copies of the Prefiled Direct Testimony of Steve Brownworth and Exhibits SB-1 through SB-4.

Please acknowledge receipt of these documents by stamping the extra copy of this letter "filed" and returning the copy to me.

Thank you for your assistance with this filing.

Sincerely,

Martin P. McDonnell

AUS ____
CAF ____
CMP ____
COM _5 + org_
CTR ____
ECR ____
GCL ____
OPC ____
MMS ____
SEC _1_
OTH ____ MPM/kll

Enclosures

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RECEIVED & FILED
FPSC-BUREAU OF RECORDS

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a copy of the foregoing Prefiled Direct Testimony of Steve Brownworth and Exhibits SB-1 through SB-4 was furnished by U.S. Mail to the following this 1st day of July, 2002:

Jason Fudge, Esq.
Adam Teitzman, Esq.
Staff Counsel
Division of Legal Services
Florida Public Service Commission
2540 Shumard Oak Boulevard
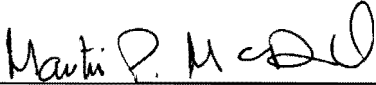Tallahassee, FL 32399-0850

Karen Camechis, Esq.
Pennington Law Firm
P. O. Box 10095
Tallahassee, FL 32302-2095

Ms. Nanette Edwards
4092 South Memorial Parkway
Huntsville, AL 35802

Nancy White, Esq.
Jim Meza, Esq.
BellSouth Telecommunications, Inc.
150 N. Monroe Street, Suite 400
Tallahassee, FL 32301

Ms. Carolyn Marek
% Time Warner Telecom
233 Bramerton Court
Franklin, TN 37069-4002

Mr. Greg Lunsford
US LEC of Florida, Inc.
6801 Morrison Blvd.
Charlotte, NC 28211-3599

_____
Martin P. McDonnell, Esq.

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DOCUMENT NUMBER-DATE

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FPSC-COMMISSION CLERK

BEFORE THE
FLORIDA PUBLIC SERVICE COMMISSION

In re: Joint petition of US LEC of Florida Inc., Time Warner Telecom of Florida, L.P., and ITC^DeltaCom Communications objecting to and requesting suspension of proposed CCS7 Access Arrangement tariff filed by BellSouth Telecommunications, Inc.	Docket No. 020129-TP Filed: July 1, 2002

DIRECT TESTIMONY OF STEVE BROWNWORTH

ON BEHALF OF ITC^DELTACOM COMMUNICATIONS, INC.

1   Q: **PLEASE STATE YOUR NAME, POSITION AND BUSINESS ADDRESS?**

2   A: My name is Steve Brownworth. I am an employee of ITC^DeltaCom

3   Communications, Inc., (ITC^DeltaCom), and my business address is 1791

4   O.G. Skinner Drive, West Point, Georgia 31833

5

6   Q: **PLEASE DESCRIBE YOUR BUSINESS EXPERIENCE AND**

7   **BACKGROUND.**

8   A: My education and relevant work experience are as follows:

9

10   I received a bachelor's degree in Quantitative Methods from the University

11   of Illinois – Chicago in 1982. I have over 18 years of telecommunications

12   experience. My experience primarily lies in the design and deployment of

13   Interexchange Carrier (IXC) and Alternative Local Exchange Company

14   (ALEC) architecture. I've held management responsibilities in these areas

15   for most of this time.

16

17   Currently I'm the Director of Systems Planning for ITC^DeltaCom. I am

18   responsible for the network architecture of the voice switch, ATM/Frame

19   and IP data networks. I've been in this position for the last 8 years. In my

20   role at ITC^DeltaCom, I've assisted other companies in their initial network

21   design and configurations including SoLinc, PowerTel and Mindspring.

22   Specifically in the area of SS7, my group manages vendor contracts, link

1   utilization, guidelines for route selection, and justification of capital and

2   expense spending.

3

4   Prior to joining ITC^DeltaCom, I spent five years, 1989-1994 with MCI, as

5   Sr. Manager, Network Design, managing strategic designs of their SONET .

6   transmission deployment, real-time restoration and reliability plans, dynamic

7   switch routing and capital cost justifications. Prior to MCI, from 1982 to

8   1989, I held management positions with Telecom*USA, SouthernNet and

9   Telesphere, in switch network design, traffic engineering, line cost, and

10   provisioning.

11

12 Q: **HAVE YOU PREVIOUSLY TESTIFIED BEFORE THIS COMMISSION?**

13 A: No.

14

15 Q: **WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

16 A: The purpose of my testimony is to describe SS7 functionality and why

17   Bellsouth's proposed SS7 tariff filing is discriminatory and fails to meet

18   minimum industry standard billing and auditing practices. I will address

19   Issues 1-3 and 5-11.

20

21 Q: **WHAT IS SS7?**

22 A: Signaling system 7 (SS7) is architecture for performing out-of-band

23   signaling in support of the call-established, routing and information

1   exchange functions of the public switched telephone network (PSTN). It

2   identifies functions to be performed by a signaling system network and a

3   protocol to enable their performance.

4

5   The SS7 network is separate from the voice network, and is used solely for

6   the purpose of switching data messages pertaining to the business of

7   connecting telephone calls and maintaining the signaling network.

8

9   Another function of SS7 is to provide access to databases. The SS7

10   network must be capable of receiving messages, routing to the appropriate

11   database, and maintaining reliable transfer of messages from the SS7

12   network into the database environment. Attached as Exhibit SB-1 is a more

13   detailed description of SS7.

14

15 **Q:** **ISSUE 1:   TO WHAT TYPE OF TRAFFIC DOES BELLSOUTH'S CCS7**

16   **ACCESS TARIFF APPLY?**

17 **A:** Based on our review of the tariff and conversations and correspondence

18   with BellSouth, BellSouth will bill on a per message basis for all SS7

19   messages that cross the SS7 Gateway to an IXC, ALEC, or wireless carrier

20   that has a pair or a quad of SS7 links directly connected to one of

21   BellSouth's SS7 Gateway Service Transfer Points (STPs). BellSouth will

22   charge that IXC, ALEC or wireless carrier for all SS7 messages, regardless

23   of whether those messages are associated with a

1   local or long distance call or "whether they are non-call-associated

2   messages" (e.g. SS7 messages associated with pagers) and will charge for

3   both those messages BellSouth originates as well as for messages

4   originated by the other carrier. (See Exhibit SB-2, email dated May 29,

5   2001 from BellSouth employee Mark Robbins to Tom Hyde, employee of

6   Cbeyond Communications, Inc.)

7

8   BellSouth has tariffed port charges, link charges, and usage charges for

9   SS7. BellSouth now charges a per message Transacting Capability

10   Application Part (TCAP) charge of $.000123, and a per message Integrated

11   Services Digital Network User Part (ISUP) charge of $.000035, in addition

12   to   the   normal   recurring   switched   access   charges   applicable   to

13   interexchange calls.

14

15   An ISUP message is for call-set up and typically there are five (5) or six (6)

16   ISUP messages on one phone call. TCAP messages are associated with

17   access to databases such as LNP, caller-id, etc. There are also database

18   dip charges to query the LNP, CNAM, and LIDB databases, in addition to

19   the TCAP message charge assessed by BellSouth.

20

21   Because ITC^DeltaCom is a third-party provider of SS7 services to

22   wireless, ALEC, IXC and Independent Telephone Companies, this tariff

23   means that ITC^DeltaCom must bear the costs for these companies'

1	signaling costs through our network, even though their trunking, in most
2	cases, is not tied to our switched network. In its tariff filing, BellSouth
3	defined ITC^DeltaCom as a third-party provider. BellSouth did not make
4	any provisions for how the third-party provider was to take data and pass-
5	through billing detail to our SS7 customers.
6	

7 Q: ISSUE 2:   DID BELLSOUTH PROVIDE CCS7 ACCESS SERVICE TO

8   ALECS, IXCS, AND OTHER CARRIERS PRIOR TO FILING ITS CCS7

9   TARIFF?

10 A: Yes. The service itself isn't new. The effect of this tariff filing is to

11   restructure charges for SS7 messages, rather than provide and charge for a

12   new service.

13

14 Q: ISSUE 3: IS BELLSOUTH'S CCS7 ACCESS ARRANGEMENT TARIFF

15   REVENUE NEUTRAL? PLEASE EXPLAIN.

16 A: This tariff filing is not revenue neutral for ITC^DeltaCom. As shown in

17   Exhibit SB-3, BellSouth began billing ITC^DeltaCom for Florida intrastate

18   SS7 messages in August of 2001. The amounts vary significantly from

19   month to month and are inconsistent with the traffic patterns of our network.

20   Finally, it appears that the number of SS7 messages being billed is

21   increasing.

22

1 **Q: ISSUE 5: WHAT DOES BELLSOUTH CHARGE SUBSCRIBERS UNDER**

2 **THE CCS7 ACCESS ARRANGEMENT TARIFF FOR THE TYPES OF**

3 **TRAFFIC IDENTIFIED IN ISSUE 1?**

4 A: Pursuant to this tariff filing, BellSouth is charging ITC^DeltaCom for all SS7

5 messages (originating and terminating) that cross BellSouth's STP.

6 BellSouth seeks to charge an ISUP message fee of $.000035 and a TCAP

7 message fee of $.0000123.

8

9 As I stated earlier, this tariff filing applies to any entity that has a connection

10 to Bellsouth's SS7 network. The net result is that wireless carriers,

11 Incumbent Local Exchange Carriers (ILECs), IXCs, and paging companies,

12 to the extent they are connected to BellSouth's SS7 network will have to

13 pay these SS7 message charges. Ultimately, these companies will have to

14 flow through these charges to their customers – the end user.

15

16 **Q: ISSUE 6:   IS MORE THAN ONE CARRIER BILLED AN ISUP OR TCAP**

17 **MESSAGE FOR THE SAME SEGMENT OF ANY GIVEN CALL?**

18 A: Yes, ITC^DeltaCom believes that inappropriate double billing is occurring.

19 In the course of a call that is routed from another carrier through BellSouth

20 and terminated to an ITC^DeltaCom end user, there will be cases where

21 both ITC^DeltaCom and the other carrier will be billed for the same

22 message of a given call.

23

1 Q. CAN YOU PROVIDE AN EXAMPLE?

2 A. In the access tariff, the most common case will be jointly provisioned

3   switched access between BellSouth and ITC^DeltaCom. Both BellSouth

4   and ITC^DeltaCom will charge an IXC carrier an equal number of ISUP

5   messages through their own SS7 networks. For a given call from an IXC to .

6   ITC^DeltaCom, where BellSouth provides the access tandem, BellSouth will

7   bill the IXC carrier for the ISUP messages from the IXC STP to the

8   BellSouth STP. The BellSouth STP will then take that message and transfer

9   it to the ITC^DeltaCom STP and BellSouth will bill ITC^DeltaCom for the

10   associated ISUP message.

11

12 Q. WHAT IS YOUR UNDERSTANDING OF BELLSOUTH'S JUSTIFICATION

13   FOR BILLING TWO ISUP MESSAGES IN THE ABOVE EXAMPLE?

14 A. Our understanding of BellSouth's position is that there are two separate

15   messages and two separate billing events when the BellSouth STP (1)

16   takes the message from the IXC and (2) transfers the message to

17   ITC^DeltaCom. BellSouth treats the STP as a billing point by billing for the

18   message incoming to the BellSouth STP and for the messaging exiting the

19   STP, even though it is the same message and the same content in the

20   message.

21

22 Q. IN YOUR EXAMPLE, IS BELLSOUTH CHARGED FOR ISUP OR TCAP

23   MESSAGES BY ANY OTHER CARRIER?

1   **A.**   No. Even though the IXC and ITC^DeltaCom STPs are equally involved in

2   the processing of the call with the BellSouth STPs, BellSouth is not billed

3   for any transaction by the other parties. If there are six (6) ISUP messages

4   sent and received by the IXC carrier, the IXC carrier will end up getting

5   billed for twelve (12) messages: six (6) ISUP messages from BellSouth and .

6   six (6) ISUP messages from ITC^DeltaCom. From the IXC view, the IXC will

7   be billed by BellSouth for the six (6) ISUP messages as well as the TCAP

8   messages and by ITC^DeltaCom for an equal number of messages for the

9   same call.

10

11   This same case exists where ITC^DeltaCom as an IXC carrier terminates

12   an intrastate call to offices other than BellSouth off the BellSouth access

13   tandem. In this case ITC^DeltaCom as the IXC carrier is charged for the

14   ISUP messages it sends BellSouth. If the end office belongs to another

15   carrier and that carrier utilizes BellSouth STPs, the end office carrier also

16   would be billed by BellSouth for the same number of ISUP messages,

17   pursuant to this tariff.   If ITC^DeltaCom's switch sent or received six (6)

18   ISUP messages, ITC^DeltaCom can expect to be billed from both

19   BellSouth and the other carrier. This assumes that the other carrier can

20   create a billing system to pass these charges back to the IXC carrier. In

21   most cases, I believe the smaller IXC, wireless and independent carriers

22   lack the capability and knowledge to implement a SS7 billing system. Also,

1   the number of messages they are billed by BellSouth, in many cases, may

2   not warrant the development and implementation of such a system.

3

4 Q: ISSUE 7: IS BELLSOUTH BILLING ISUP AND TCAP MESSAGES THAT

5   ORIGINATE ON ALEC NETWORKS AND TERMINATE ON .

6   BELLSOUTH'S NETWORK?

7 A: Yes. BellSouth's SS7 tariff filing applies a charge per ISUP and TCAP

8   message for all calls (local, long distance, wireless, and non-content calls

9   such as pagers) for both originating and terminating messages on the same

10   call. In other words, BellSouth bills for both the messages BellSouth's

11   customer originates as well as the messages that the other carrier

12   originates.

13

14 Q. IS BELLSOUTH'S BILLING APPROACH APPROPRIATE?

15 A. No. Companies that provide SS7 functionality (IXCs, ALECs, wireless

16   carriers, ILECs etc.) are equally involved in the signaling of these SS7

17   messages. BellSouth does not own or control all of the transmitting

18   facilities. It is inappropriate for BellSouth to charge for all the signaling of

19   messages associated with a call. Further, as described more fully below in

20   connection with Issue 9, BellSouth is offering a "bill and keep" arrangement

21   to ILECs and to our knowledge does not currently bill ILECs with STPs

22   connected directly to BellSouth. Clearly, any such arrangement should be

23   offered on a nondiscriminatory basis.

1

2 From a historical perspective, access cost is and has always been a cost

3 input to IXCs and thus served as one of the integral costs for the billing of

4 toll services. This cost is passed to the end user in the form of long distance

5 rates. To charge an ALEC instead of or in addition to the IXC for what has .

6 traditionally been an input cost to long distance would create a situation

7 where the ALEC would be forced to raise local rates to their local customers

8 to offset the interexechange carrier's cost of toll and recover its own costs.

9 The net result would be local carriers subsidizing long distance services. If

10 this tariff filing is permitted to go into effect, the phrase "third party provider"

11 must be removed and replaced with "interexchange carrier" or "a carrier

12 acting as an interexchange carrier" in order to avoid such a subsidy.

13

14 **Q:** **ISSUE 8: WHAT IS THE IMPACT, IF ANY, OF BELLSOUTH'S CCS7**

15 **ACCESS ARRANGEMENT TARIFF ON SUBSCRIBERS?**

16 **A:** If "subscriber" is defined as "third party provider" as set forth in BellSouth's

17 tariff filing, this tariff will force ITC^DeltaCom and other third party providers

18 either to become unwilling billing agents for BellSouth access charges or

19 absorb unreasonable and duplicative expenses. Ultimately, end-user

20 subscribers will experience price increases as these costs are passed on to

21 them.

22

1 **Q.** **IS IT CURRENTLY POSSIBLE FOR ITC^DELTACOM TO PROPERLY**

2 **PASS THROUGH BELLSOUTH'S CCS7 CHARGES TO OTHER**

3 **CARRIERS?**

4 **A.** No. The information we receive from BellSouth is insufficient to allow us to

5 pass costs through to other carriers. In order for us to properly pass

6 through BellSouth's CCS7 charges, we would first need SS7 call records

7 with OPC (Originating Point Code) and DPC (Destination Point Code)

8 information so that each SS7 message can be related (and billed) to the

9 proper carrier. Next, In addition to billing messages to the third-party

10 customers, ITC^DeltaCom would have to require all of our customers to

11 report jurisdictional reporting of the messages for local and interLATA

12 usage. The billing we receive from BellSouth today is a total count of

13 messages in the state broken down by jurisdictionality (inter and intrastate)

14 and message category (TCAP and ISUP)

15

16 In order to bill our customers properly, ITC^DeltaCom will have to

17 implement more sophisticated capture and billing systems than BellSouth

18 provides. To determine which carriers used messages to BellSouth,

19 ITC^DeltaCom will have to look at each billable message the STP

20 produces, identify the OPC/DPC combination and relate that combination to

21 the customer. We will then have to apply the appropriate jurisdictional

22 reporting percentages and produce a new usage billing to our current SS7

23 and IXC access customers.

1   Q.   IS IT POSSIBLE TO PROPERLY ALLOCATE SS7 MESSAGES TO THE

2   APPROPRIATE JURISDICTION FOR PURPOSES OF APPLYING

3   ACCESS CHARGES?

4   A.   No. Currently, BellSouth doesn't have a mechanism for an ALEC or third-

5   party SS7 provider to submit a jurisdictional report for a proper allocation of .

6   SS7 messages between local and access. ITC^DeltaCom's third-party

7   customers (ALECs, Independents and Wireless) have mostly local calls, so

8   ITC^DeltaCom will be mis-billed by BellSouth applying access charges to

9   signaling associated with the local interconnection trunk groups of

10   ITC^DeltaCom and its customers. ITC^DeltaCom has the additional burden

11   to ask our SS7 customers for reports based on the messages the carrier

12   sends to us. To date, BellSouth has not given us the proper instructions or

13   forms to separate local messages from access messages. Currently, we

14   are billed for SS7 messages for calls that are BellSouth originated on the

15   local interconnection trunks as interstate and intrastate calls because

16   BellSouth does not have the ability to accept local SS7 utilization reporting.

17

18 Q.   HOW HAS ITC^DELTACOM REACTED TO BELLSOUTH'S TARIFF

19   FILING?

20 A.   We have not added any new customers to our product line and are

21   reviewing our position of being a third-party provider. In addition, we are

22   currently working with other companies to find ways to route SS7 around

23   BellSouth. Unfortunately, as long as BellSouth remains the access tandem

1   provider for their areas, carriers cannot avoid ISUP message charges from

2   BellSouth.

3

4 Q. ISSUE 9:   DOES BELLSOUTH BILL ILECS FOR THE SIGNALING

5   ASSOCIATED WITH THE TYPES OF TRAFFIC IDENTIFIED IN ISSUE 1?

6 A. No. BellSouth's SS7 tariff filing is therefore discriminatory to other carriers.

7

8 Q. PLEASE EXPLAIN.

9 A: ITC^DeltaCom has asked BellSouth whether it has in the past charged or

10   intends to charge Independent Local Exchange Carriers ("ILECS") for SS7

11   messages. To date, BellSouth has provided no answer other than stating

12   that ITC^DeltaCom can adopt any other interconnection agreement on file

13   with the Commission. ITC^DeltaCom is not aware of any agreement filed

14   with the Florida Public Service Commission that provides ALECs with "bill

15   and keep" on SS7 messages/usage, ports and links such as that offered in

16   the BellSouth template for ILECs.

17

18   Recently, ITC^DeltaCom obtained a copy of the proposed interconnection

19   agreement that BellSouth sent to the ILECs. The portion of that proposed

20   interconnection agreement related to the SS7 signaling is attached hereto

21   as Exhibit SB-4. That agreement provides that there will be no charges for

22   SS7 where the ILEC connects with BellSouth via a bridge link (B-Link) for

23   SS7 messages or usage, port or links so long as the ILEC uses the B-Link

| 1 | for public switched network traffic and the agreement applies to both local |
| 2 | and intraLATA calls. |

3

4 **Q: IS BELLSOUTH'S TARIFF DISCRIMINATORY WITH REGARD TO**

5 **BILLING DETAIL?**

6 **A.** Yes. BellSouth unreasonably discriminates between access customers and

7 SS7 customers by failing to provide minimum billing detail necessary for

8 auditing and billing of SS7 records.

9

10 **Q. PLEASE EXPLAIN.**

11 **A.** Today, BellSouth maintains billing records containing the origination and

12 termination of toll calls such that Bellsouth is able to appropriately bill

13 switched access minutes of use (MOU). Upon request, BellSouth provides

14 access customers billing detail information at no extra charge such that the

15 billing can be verified and so that access customers can audit BellSouth

16 billing. In contrast, BellSouth effectively refuses to provide the originating

17 and terminating message detail (Originating Point Code and Destination

18 Point Code) and apparently refuses to retain records for auditing purposes.

19 BellSouth retains records for switched access for billing minutes of use to

20 access customers. BellSouth should maintain records and provide billing

21 detail for billing switched access for these messages just as they do for the

22 minutes associated with these toll calls.

23

1   Q.   HAS BELLSOUTH OFFERED ANY EXPLANATION FOR ITS FAILURE

2   TO PROVIDE BILLING DETAIL?

3   A.   BellSouth states that providing bill detail such as the OPC and DPC for

4   those SS7 messages associated with switched access calls is a "service"

5   and BellSouth has indicated that they would charge approximately

6          $300,000 per year per company to provide this minimum level of billing

7   detail. This is unreasonably discriminatory. The rules that apply to

8   maintaining data for billing switched access to IXCs should also apply to

9   maintaining data for billing the messages on those switched access calls.

10   Since BellSouth has to retain records including calling party and called

11   party information for billing switched access minutes of use, they must also

12   retain the message detail if they intend to bill for the messages associated

13   with those switched access minutes of use.

14

15   Q: ISSUE 10:   WHAT ACTIONS SHOULD THIS COMMISSION TAKE?

16   A: This Commission should reject BellSouth's tariff filing as it is discriminatory.

17   Furthermore, BellSouth is either unwilling or unable to provide sufficient

18   billing detail associated with these messages in order for carriers such as

19   ITC^DeltaCom to properly audit BellSouth's billing. If, however, this

20   Commission approves BellSouth's tariff filing, this Commission should

21   require Bellsouth to provide a minimum level of billing detail including OPC

22   and DPC data.

23

1 Q: ISSUE 11: IF THE TARIFF IS TO BE WITHDRAWN, WHAT

2 ALTERNATIVES IF ANY, ARE AVAILABLE TO BELLSOUTH TO

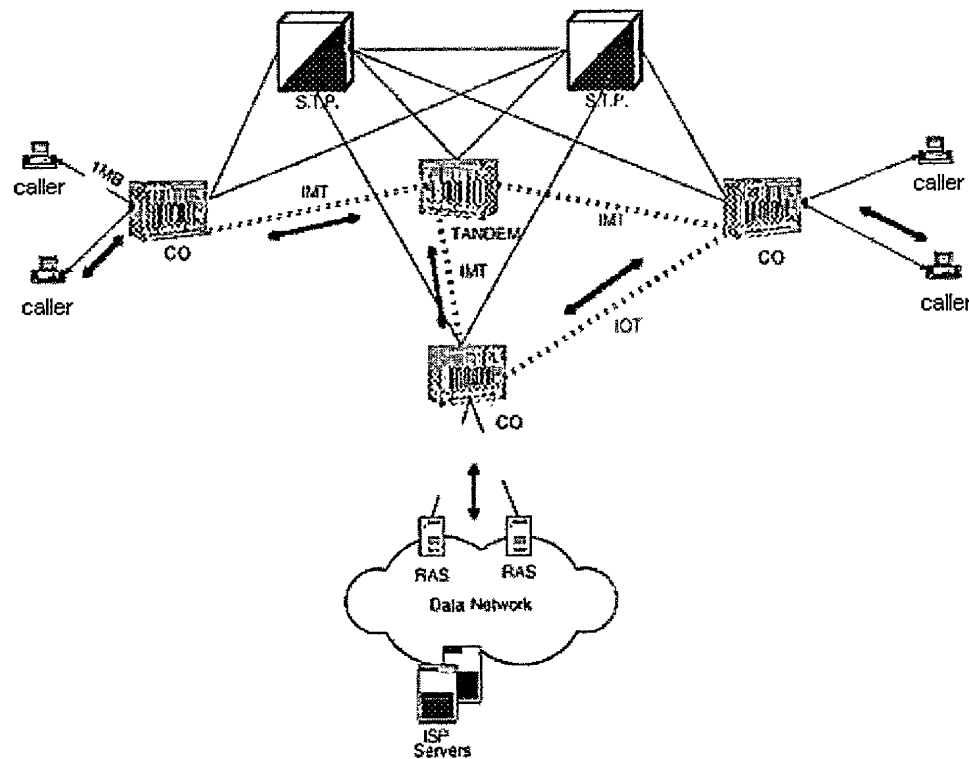3 ESTABLISH A CHARGE FOR NON-LOCAL CCS7 ACCESS SERVICE

4 PURSUANT TO FLORIDA LAW?

5 A: Since BellSouth claims that this tariff filing is revenue neutral, then

6 withdrawing this tariff filing and reinstating the previous tariff rates, terms

7 and conditions is all that is required.

8

9 Q: DOES THIS CONCLUDE YOUR TESTIMONY?

10 A: Yes.

SS7 OVERVIEW

What is SS7?

- Signaling system 7 (SS7) is an architecture for performing out-of-brand signaling in support of the call-established, routing and information exchange functions of the public switched telephone network (PSTN). It identifies functions to be performed by a signaling system network and a protocol to enable their performance.

- The SS7 network is separate from the voice network, and is used solely for the purpose of switching data messages pertaining to the business of connecting telephone calls and maintaining the signaling network.

- Packet switching is the method used for transferring messages through the network.

What is SS7? (cont.)

- Telephone switches are referred to as signaling points. The originator and receiver of all messages in the network is located at the end office. All messages are switched through multiple networks using transfer points (STPs).

- These transfer points do not originate messages and are seldom the receivers of messages; they are used to through-switch the packets which are received from end offices.

- Another function of SS7 is to provide access to databases. The SS7 network must be capable of receiving messages, routing to the appropriate database, and maintaining reliable transfer of messages from the SS7 network into the database environment.

History On SS7

- The ITU-TS (once known as the CCITT) developed a digital signaling standard in the mid 60's called the Signaling System #6 that would revolutionize the telephone industry.

- Common Channel Signaling (CCS) was first introduced in the U.S. in the 1960s as Common Channel Interoffice Signaling System #6 (SS6).

- Signaling System #7 (SS7) was derived from the earlier SS6, which explains the similarities. SS7 provides much more capability than SS6. Where SS6 used fixed-length signal units, SS7 uses variable-length signaling units and uses high speed data links (56kbps).

- As SS7 began deployment in the mid-1980s, SS6 was phased out of the network. SS7 was used in the interoffice network and was not immediately deployed in the local offices until many years later.

- Today most telecommunications carries rely on SS7 for more than simple call processing.

What Services Utilize SS7?

- Calling card processing and validation
- Access to Toll-Free (SMS) databases, for 8xx toll free numbers.
- Number Portability for access to the NPAC and LRNs for routing calls to the correct carrier.
- Number Pooling for 1,000 blocks of numbers to conserve NXX code consumption.
- CLASS Services like repeat dialing and call return.

Service Utilizing SS7 (cont.)

- Cellular Networks for roaming utilize IS-41 information from network HLRs (Home Location Registers). Allow cellular networks to verify valid users and user locations, across different systems.

- Advanced call features of CNAM and ANI number delivery. Allows ANI to flow between networks.

- Normal Call Processing (ISUP) of every type of call, except E911 services.

Other Benefits of SS7?

- Determines if distant end phone is busy, so originating switch can deliver busy signal, as to not tie-up the PSTN.

- Signaling out of band allows the call to be set-up quickly, in 1-2 seconds versus 6-8 seconds with non-SS7 trunks.

- Network Management tools on congestion allows routing of TSP and other priority calls. Allows switches to notify each other when trunks are out of services for maintenance or troubles.

SS7 Architecture
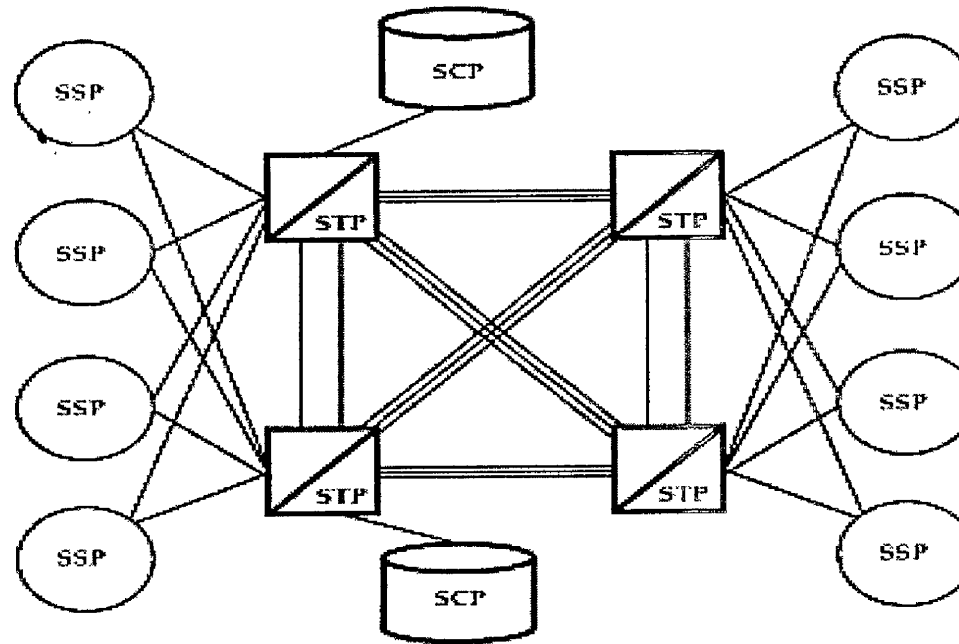
- Service Switching Point (SSP) - Switches
- Service Transport Point (STP) - Transfer Points
- Service Control Point (SCP) - Databases/ Information.

SS7 Architecture (cont.)

- Service Switching Point (SSP)- SSPs are telephone switches (end office and tandems) equipped with SS7-capable software and terminating signaling links. They generally originate, terminate, or switch calls.

- Service Transport Point (STP)- STPs are the packet switches of the SS7 network. They receive and route incoming signaling messages towards the proper destination. They also perform specialized routing functions.

- Service Control Point (SCP)- SCPs are databases that provide information necessary for advanced call-processing capabilities.

- Links are 56 kpbs, future links will be at DS1 speeds.

- Network Diversity/Redundancy is key to Network Integrity, with STPs and SCPs typically deployed in pairs ("mated pairs"), with multiple paths.

Link Types
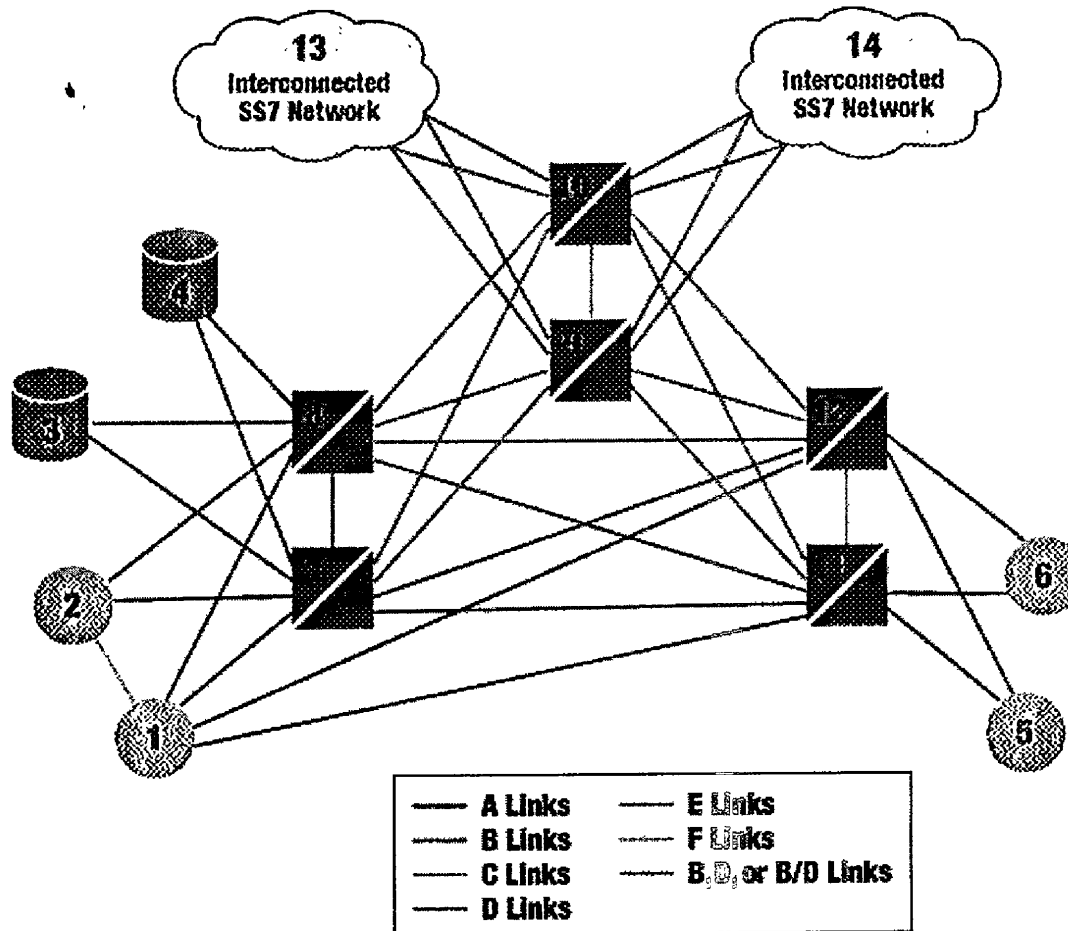
Link Types (cont.)

- A Links - A links interconnect an STP to either an SSP or an SCP, which are collectively referred to as signaling end points ("A" stands for access). A links are used for the sole purpose of delivering signaling to or from the signaling end points. Examples of A links are 2–8, 3–7, and 5–12.

- B/D Links- Regardless of their name, their function is to carry signaling messages beyond their initial point of entry to the signaling network towards their intended destination. The "B" stands for bridge and describes the quad of links interconnecting peer pairs of STPs. The "D" denotes diagonal and describes the quad of links interconnecting mated pairs of STPs at different hierarchical levels.

- C Links- C links are links that interconnect mated STPs. As will be seen later, they are used to enhance the reliability of the signaling network in instances where one or several links are unavailable. "C" stands for cross (7–8, 9–10, and 11–12 are C links

Link Types (cont.)

- E Links- While an SSP is connected to its home STP pair by a set of A links, enhanced reliability can be provided by deploying an additional set of links to a second STP pair. These links, called E (extended) links provide backup connectivity to the SS7 network in the event that the home STPs cannot be reached via the A links. (1–11 and 1–12 are E links.)

- F Links- F (fully associated) links are links which directly connect two signaling end points. F links allow associated signaling only. Because they bypass the security features provided by an STP, F links are not generally deployed between networks. (1–2 is an F link.)

Call Set-Up Example


Subscriber Line
Voice Trunk
Signaling Link
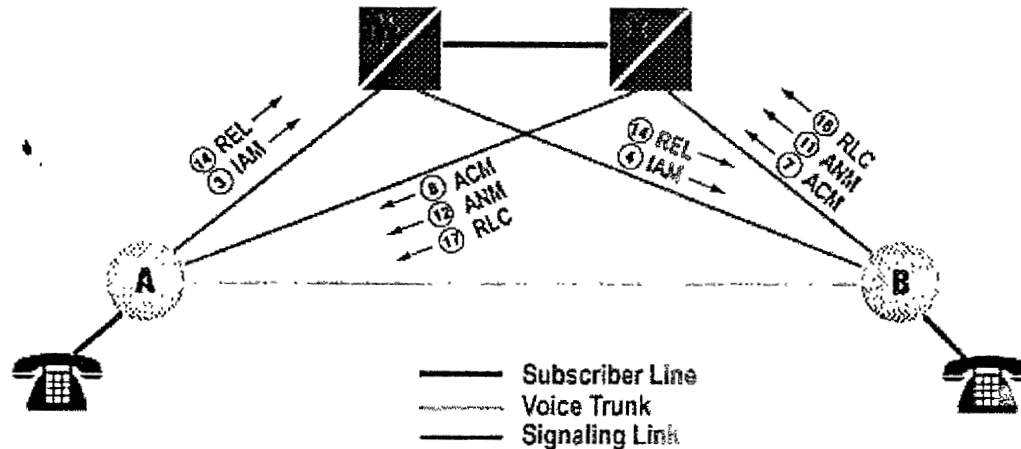
- Switch A analyzes the dialed digits and determines that it needs to send the call to switch B.

- Switch A selects an idle trunk between itself and switch B and formulates an initial address message (IAM), the basic message necessary to initiate a call. The IAM is addressed to switch B. It identifies the initiating switch (switch A), the destination switch (switch B), the trunk selected, the calling and called numbers, as well as other information beyond the scope of this example.

Call Set-Up Example (cont.)


```
———  Subscriber Line
—·—·—  Voice Trunk
———  Signaling Link
```
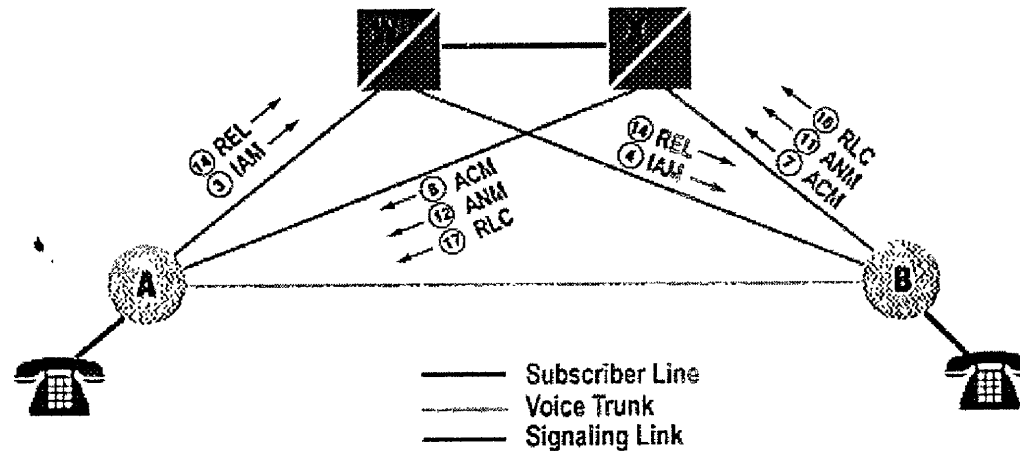
- Switch A picks one of its A links (e.g., AW) and transmits the message over the link for routing to switch B.

- STP W receives a message, inspects its routing label, and determines that it is to be routed to switch B. It transmits the message on link BW.

- Switch B receives the message. On analyzing the message, it determines that it serves the called number and that the called number is idle.

- Switch B formulates an address complete message (ACM), which indicates that the IAM has reached its proper destination. The message identifies the recipient switch\(A), the sending switch (B), and the selected trunk.

Call Set-Up Example (cont.)

Subscriber Line
Voice Trunk
Signaling Link
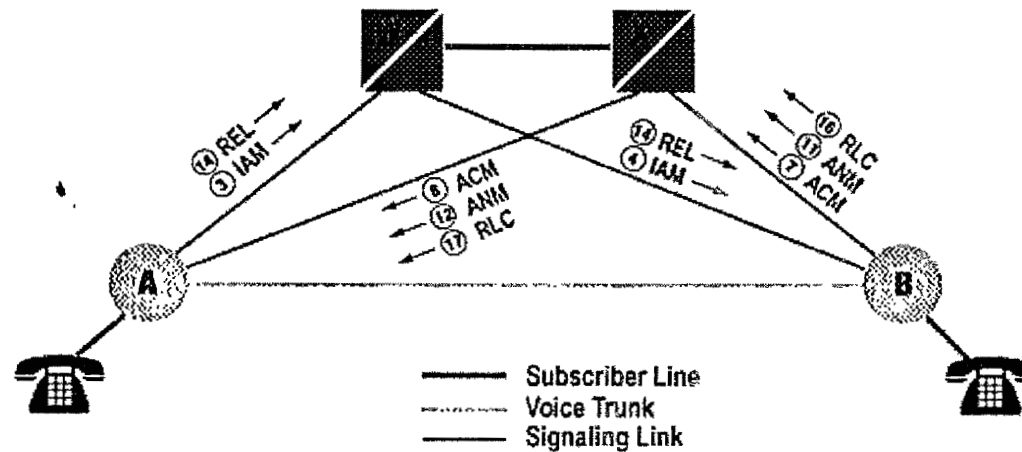
- Switch B picks one of its A links (e.g., BX) and transmits the ACM over the link for routing to switch A. At the same time, it completes the call path in the backwards direction (towards switch A), sends a ringing tone over that trunk towards switch A, and rings the line of the called subscriber.

- STP X receives the message, inspects its routing label, and determines that it is to be routed to switch A. It transmits the message on link AX.

- On receiving the ACM, switch A connects the calling subscriber line to the selected trunk in the backwards direction (so that the caller can hear the ringing sent by switch B).

Call Set-Up Example (cont.)

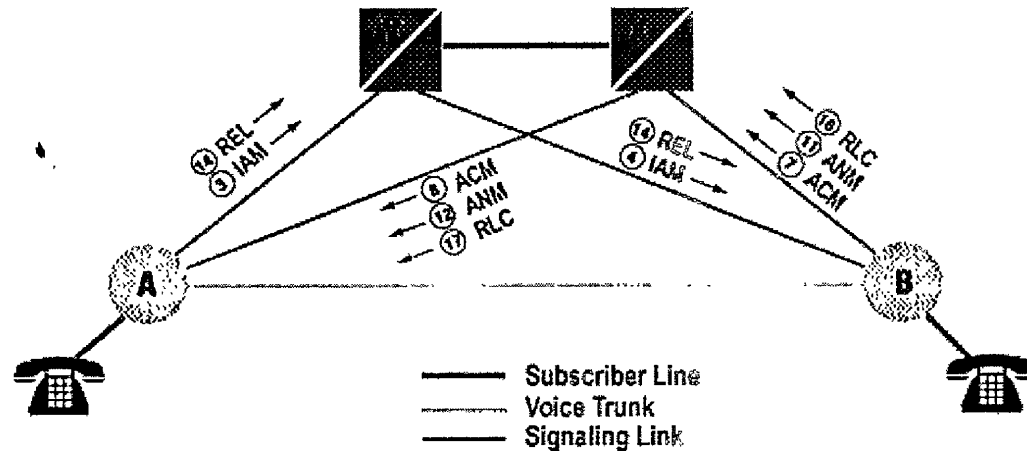Subscriber Line
Voice Trunk
Signaling Link
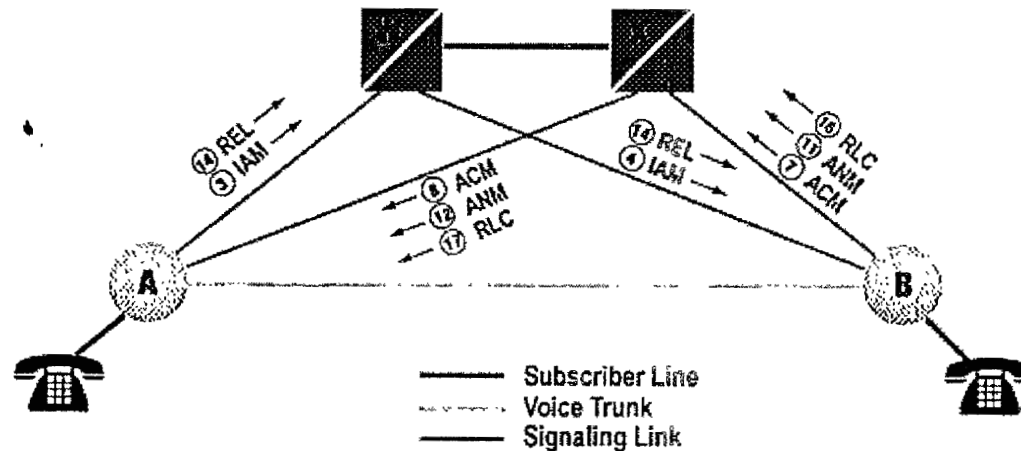
- When the called subscriber picks up the phone, switch B formulates an answer message (ANM), identifying the intended recipient switch (A), the sending switch (B), and the selected trunk.

- Switch B selects the same A link it used to transmit the ACM (link BX) and sends the ANM. By this time, the trunk also must be connected to the called line in both directions (to allow conversation).

- STP X recognizes that the ANM is addressed to switch A and forwards it over link AX.

Call Set-Up Example (cont.)
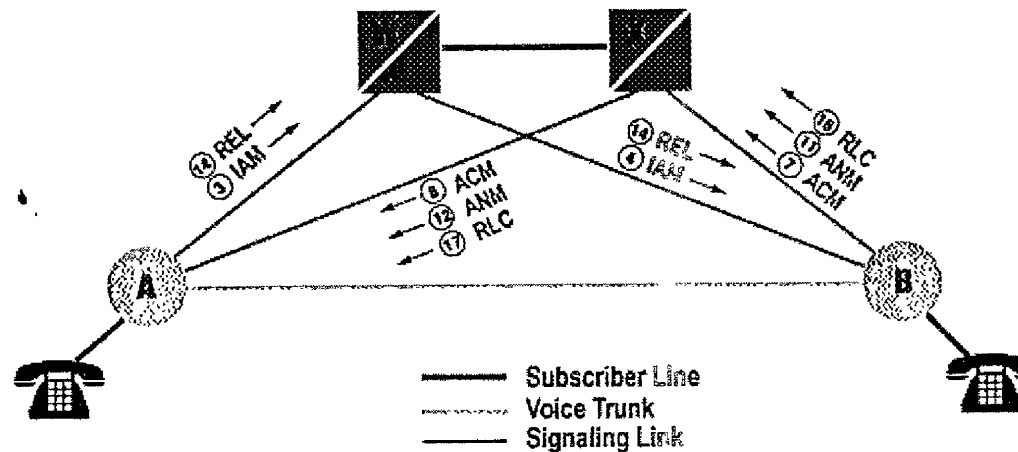
- Switch A ensures that the calling subscriber is connected to the outgoing trunk (in both directions) and that conversation can take place.

- If the calling subscriber hangs up first (following the conversation), switch A will generate a release message (REL) addressed to switch B, identifying the trunk associated with the call. It sends the message on link AW.

- STP W receives the REL, determines that it is addressed to switch B, and forwards it using link WB.

Call Set-Up Example (cont.)


Subscriber Line
Voice Trunk
Signaling Link

- Switch B receives the REL, disconnects the trunk from the subscriber line, returns the trunk to idle status, generates a release complete message (RLC) addressed back to switch A, and transmits it on link BX. The RLC identifies the trunk used to carry the call.

- STP X receives the RLC, determines that it is addressed to switch A, and forwards it over link AX.

Database Query
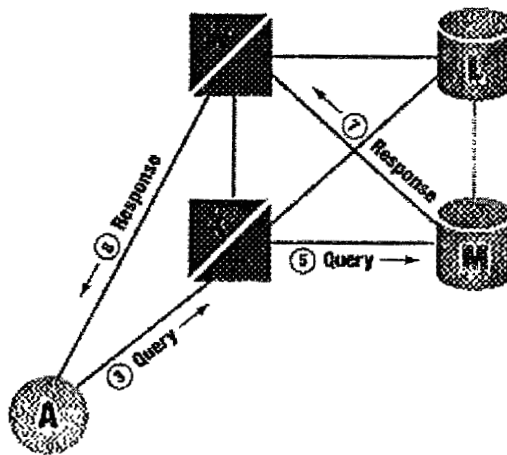
- A subscriber served by switch A wants to reserve a rental car at a company's nearest location. She dials the company's advertised 800 number.

- When the subscriber has finished dialing, switch A recognizes that this is an 800 call and that it requires assistance to handle it properly.

- Switch A formulates an 800 query message including the calling and called number and forwards it to either of its STPs (e.g., X) over its A link to that STP (AX).

- STP X determines that the received query is an 800 query and selects a database suitable to respond to the query (e.g., M).

Database Query (cont.)
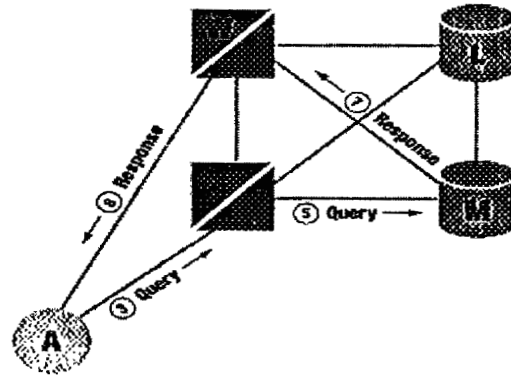
- STP X forwards the query to SCP M over the appropriate A link (MX). SCP M receives the query, extracts the passed information, and (based on its stored records) selects either a real telephone number or a network (or both) to which the call should be routed.

- SCP M formulates a response message with the information necessary to properly process the call, addresses it to switch A, picks an STP and an A link to use (e.g., MW), and routes the response.

- STP W receives the response message, recognizes that it is addressed to switch A, and routes it to A over AW.

- Switch A receives the response and uses the information to determine where the call should be routed. It then picks a trunk to that destination, generates an IAM, and proceeds (as it did in the previous example) to set up the call.

Other Terminology used in SS7 World

- OPC- Originating Point Code- The address of the message originator or where the call process or information query starts.

- DPC- Destination Point Code- The address of the node to which the message is being sent or where the message terminates.

- ISUP- ISDN User Port- used for both ISDN & non-ISDN calls. It is used to establish & then tear down trunks in voice &data calls. Every call has ISUP messages in an SS7 network.

- TCAP- Transaction Capabilities Application Port- Messages and protocols used to communicate data between applications. These are database services which the most common are 800/888, AIN, and LNP and calling card.

-----Original Message-----
From: Mark.Robbins@bridge.bellsouth.com
[mailto:Mark.Robbins@bridge.bellsouth.com]
Sent: Tuesday, May 29, 2001 4:58 PM
To: tom.hyde@Cbeyond.net
Cc: doberg@illuminet.com; William.French2@bellsouth.com;
julia.strow@Cbeyond.net; Mark.Robbins@bridge.bellsouth.com;
David.B.Veasey@bridge.bellsouth.com
Subject: RE: TCAP & ISUP Billing

Tom,

Here is the response from the SS7 SMEs concerning the SS7 tariff filing:

1)   Pursuant to CC docket 96-95, BellSouth has filed a tariff to begin
billing on a per message basis for all SS7 messages handled by BellSouth for
an
interconnecting customer. An interconnecting customer is defined as one that
has a pair or a quad of SS7 links directly connected to one of BellSouth's
SS7
Gateway STPs. BellSouth will be charging the directly connected SS7 customer
for all SS7 messages defined in the tariff, whether they are associated with
a
local or long distance call or whether they are non-call-associated
messages.
From BellSouth's perspective, the tariff was filed as "revenue neutral". At
the
FCC's request, the monies gathered by the new tariffs will be offset by
reductions to the InterLATA carriers in local access charges. It is the
FCC's
contention that, to this point, the InterLATA carriers had been paying the
way
for all SS7 capability and that now the costs would be more equitably spread
across all interconnecting companies.

2) BellSouth will not be charging or billing Cbeyond for any SS7 messages
because Cbeyond does not have SS7 links connected to BellSouth.

3) Your SS7 provider will be required to provide BellSouth with the
Signaling
PIU and a Signaling PLU. These will be used to determine the per cent of the
taxes on these revenues that go to the state and local governments and the
per
cent that go to the federal government. The rates for local, intraLATA,
interLATA, and non-call-associated signaling messages are the same.

Mark

ITC^DeltaCom SS7 USAGE SUMMARY

Period		FL INTER	FL INTRA
200108	TCAP MESSAGES	265,589	265,595
	TCAP CHARGES	$32.72	$32.75
	PER MESSAGE	$0.000123	$0.000123
	ISUP MESSAGES	6,350,745	6,350,756
	ISUP CHARGES	$222.26	$222.26
	PER MESSAGE	$0.000035	$0.000035
200109	TCAP MESSAGES	4,052,349	4,052,358
	TCAP CHARGES	$498.50	$498.51
	PER MESSAGE	$0.000123	$0.000123
	ISUP MESSAGES	95,237,156	95,237,160
	ISUP CHARGES	$3,333.31	$3,333.31
	PER MESSAGE	$0.000035	$0.000035
200110	TCAP MESSAGES	3,850,131	629,020
	TCAP CHARGES	$473.63	$77.43
	PER MESSAGE	$0.000123	$0.000123
	ISUP MESSAGES	93,282,434	13,159,931
	ISUP CHARGES	$3,264.90	$848.96
	PER MESSAGE	$0.000035	$0.000065
200111	TCAP MESSAGES	4,689,206	-
	TCAP CHARGES	$576.83	$0.00
	PER MESSAGE	$0.000123	$0.000000
	ISUP MESSAGES	107,781,090	-
	ISUP CHARGES	$3,772.34	$0.00
	PER MESSAGE	$0.000035	$0.000000
200112	TCAP MESSAGES	4,826,012	-
	TCAP CHARGES	$593.67	$0.00
	PER MESSAGE	$0.000123	$0.000000
	ISUP MESSAGES	110,563,381	-
	ISUP CHARGES	$3,869.71	$0.00
	PER MESSAGE	$0.000035	$0.000000
200201	TCAP MESSAGES	5,005,866	
	TCAP CHARGES	$615.78	$0.00
	PER MESSAGE	$0.000123	$0.000000
	ISUP MESSAGES	117,707,382	-
	ISUP CHARGES	$4,119.74	$0.00
	PER MESSAGE	$0.000035	$0.000000
200202	TCAP MESSAGES	2,266,418	137,709
	TCAP CHARGES	$278.89	$16.97
	PER MESSAGE	$0.000123	$0.000123
	ISUP MESSAGES	58,241,941	11,518,511

	ISUP CHARGES	$2,038.46	$403.15
	PER MESSAGE	$0.000035	$0.000035
200203	TCAP MESSAGES	5,647,746	5,647,761
	TCAP CHARGES	$694.74	$694.92
	PER MESSAGE	$0.000123	$0.000123
	ISUP MESSAGES	121,425,590	120,983,541
	ISUP CHARGES	$4,249.89	$4,234.41
	PER MESSAGE	$0.000035	$0.000035
200204	TCAP MESSAGES	4,579,248	4,579,254
	TCAP CHARGES	$563.28	$563.28
	PER MESSAGE	$0.000123	$0.000123
	ISUP MESSAGES	95,787,445	95,787,447
	ISUP CHARGES	$3,352.57	$3,352.57
	PER MESSAGE	$0.000035	$0.000035

Docket No. 020129-TP
S. Brownworth Ex. SB-4
BellSouth SS7 Bill & Keep Proposal to ILECs

ATTACHMENT 2
COMMON CHANNEL SIGNALING SYSTEM 7 (SS7)

ATTACHMENT 2

COMMON CHANNEL SIGNALING SYSTEM 7 (SS7 or SS7) INTERCONNECTION

1.   **Definitions**

For the purpose of this Attachment and its Exhibits, the following terms shall be defined as:

1.1   **A-Links** - A-Links are CCS7 signaling links that interconnect CCS7 network Signaling Points and Service Switching Points with their home Signaling Transfer Point pair. CCS7 network specifications require two A-Links per Signaling Point or Service Switching Point.

1.2   **A-Link Concentrator (ALC)** - An enhanced Signaling Point in a Common Channel Signaling network typically serving as a hub for connection of Signaling Link sets from multiple Signaling Points, and which has some of the functions of a Signaling Transfer Point. ALCs may be deployed in simplex (single) or mated pair configurations.

1.3   **B-Links** - B-Links are SS7 signaling links that interconnect one SS7 network Signaling Transfer Point to another Signaling Transfer Point pair at the same level of SS7 network hierarchy. SS7 network specifications require four ("a quad of") B-Links to interconnect two pairs of Signaling Transfer Points.

1.4   **Common Channel Signaling System 7 (CCS7)** - A network signaling technology using Signaling System 7 (SS7) protocol in which all signaling information between two or more signaling nodes is transmitted over dedicated, high-speed data links (out-of-band signaling), rather than over the public switched network (in-band signaling).

1.5   **Integrated Services Digital Network User Part (ISUP)** - ISUP provides the Signaling System 7 application-level communications necessary for a variety of signaling services, including call setup and disconnect.

1.6   **Joint Service** - Joint service shall mean voice and/or data service that, between its originating and terminating locations, transits the facilities of both BellSouth and the Independent Company.

1.7   **Network Identification Code (NIC)/Also Commonly Referred To As Point Code (PC)** - A 24 bit binary code to identify a specific signaling point or node on the SS7 network. This code is broken down into three primary fields: Network Identity Field, Network Cluster Field and Cluster Member Field.

1.8   **Point Code (PC)** - SEE NETWORK IDENTIFICATION CODE (NIC)

1.9   **Service Control Point (SCP)** - A real-time data base system that contains instructions on how public switched messages are to be routed and handled by the public switched network.

1.10   **Service Management System (SMS)** - The main operational support and control system of all Advanced Intelligent Network Services, including 800 Data Base Service.

1.11   **Service Switching Points (SSPs)** - Tandem and end office switches in the telephone public switched network equipped with SS7 feature sets that provide the capability to communicate with the Service Control Points (data bases) in order to obtain call handling instructions.

1.12   **Signaling Link** - A full duplex 56/64-Kilobit digital data circuit used to transport SS7 signals between signaling nodes.

1.13   **Signaling Link Ports** - Signaling Link terminations on a signaling Point or Signaling Transfer Point.

1.14   **Signaling Points (SPs)** - Tandem and end office switches in the telephone public switched network equipped with SS7 feature sets that provide the capability of call setup/teardown and call routing using SS7 technology.

1.15   **Signaling System 7 (SS7)** - A protocol, or set of communications procedures, used in common channel signaling for passing routing information between telecommunication switches and signaling network nodes.

1.16   **Signaling Transfer Points (STPs)** - The packet switches in the SS7 network as defined by the BellCore "Signaling Transfer Point Generic Requirements" document TR-TSY-000082 used to route SS7 signaling information between signaling network nodes for processing call setup and routing intelligence.

1.17   **Transaction Capabilities Application Part (TCAP)** - TCAP provides application-level functions for special common Channel Signaling services provided by the Stored Program Control System (SPCS). Service information exchange between the SPCS and a network database would typically be defined within TCAP.

2.   Scope

2.1   This Attachment will cover the terms and conditions and the various scenarios for which BellSouth will provide to ITC access to the BellSouth SS7 Network for signaling interconnection.

3.   Physical Connection

3.1   ITC interconnection with BellSouth for SS7 signaling capability shall require full duplex 56-Kilobit digital data links in sets of A-Links or quads of B-Links, depending upon the interconnection configuration. All links shall meet BellSouth's reliability and transmission specification requirements.

3.2   Each Party shall be responsible for the installation and maintenance of the portion of the signaling links within its respective territory up to the Point of Interconnection between the Parties.

3.3   Message (voice or data) trunks shall be converted from Multi-frequency (MF) to SS7 capable trunks, as required, for SS7 signaling capabilities.

3.4   All ITC signaling nodes and links shall meet BellSouth's SS7 protocol operational compatibility assurance requirements. These may include, but are not limited to:

- BellSouth's Guide to Technical Publication TR-TSV-000905 (Common Channel Signaling Network Interface Specifications)

- BellSouth's Guide to Technical Publication TR-TSV-000954 (Common Channel Signaling Network Interface Specifications – Additional Material Supporting Alternate Billing Services (ABS))

- BellSouth's Guide to Technical Publication TA-TSV-000962 (Common Channel Signaling Network Interface Specifications Supporting ISDN)

- BellSouth's Guide to Technical Publication TA-TAP-001004 (Operations Guidelines for Common Channel Signaling Interface Specifications)

- BellSouth's Guide to Technical Publication TR-NPL-000246 (Message Transfer Part (MTP), Signaling Connection Control Part (SCCP), ISDN User Part (ISDN-UP), Transaction Capabilities Application Part (TCAP)

- BellSouth's Guide to Technical Publication TR-TSY-000394 (Switching System Requirements for Interexchange Carrier Interconnection Using the Integrated Services Digital Network User Part (ISDN-UP))

- BellSouth's Guide to Technical Publication TR-TSY-000317 (Call Control Using the ISDN User Part)

3.5   CCS7 interconnection shall make available to ITC call setup and data base access capabilities and services as defined in the Exhibits to this Attachment and as allowed by legal and regulatory authorities.

3.6   ITC shall not utilize its interconnection with BellSouth's SS7 Network for transport of any SS7 signals from any other SS7 network provider's SS7 network; i.e., SS7 Hubbing Companies.

This interconnection is intended for SS7 ISUP and TCAP messaging required to provide voice services on or across the Independent Local Exchange Carrier's (ILEC's) Public Switched Network (PSN). Any other use shall be considered a material breach of this Attachment and all SS7 Access Tariff charges shall apply.

3.7   Overload Controls: ITC acknowledges and agrees that SS7 Network overload due to extraordinary volumes of Queries and/or other SS7 Network messages can and will have a detrimental effect on the performance of BellSouth's SS7 Network. ITC further agrees that BellSouth, in its sole discretion, shall employ certain automatic and/or manual overload controls within BellSouth's SS7 Network to guard against these detrimental effects. BellSouth shall report to ITC any instances where overload controls are invoked due to ITC's SS7 Network and ITC agrees in such cases to take immediate corrective actions as are reasonably necessary to cure the conditions causing the overload situation.

4.   SS7 Network Identification Codes

4.1   ITC shall obtain and utilize its own Network Identification Codes (NICs)/Point Codes (PCs) for interconnection purposes when interconnecting to BellSouth's SS7 network.

4.2   ITC will be responsible for notifying BellSouth and other SS7 network providers of such code assignments and the services for which they will be used.

4.3   Due to the complexities and potential ITC signaling network downtime required when changing working NIC/PC, ITC agrees to give BellSouth a written notice of a NIC/PC change six months prior to the effective date of the NIC/PC change.

5.   Compensation

5.1   Compensation for the services and capabilities provided under this Attachment are set forth in Exhibit A, attached hereto and incorporated herein by this reference.

6.　Proprietary Information/Ownership

6.1　All computer programs, software, drawings, diagrams, specifications, and other materials now licensed/developed by BellSouth or which may be licensed/developed by BellSouth in connection with Common Channel Signaling/Signaling System 7 Interconnection Service, whether or not licensed/developed at the specific request of ITC, are and shall remain the property of BellSouth and ITC, except as may be set forth by a separate License/Sublicense Agreement, acquires no license, sublicense or rights in same by virtue of this Attachment or the provision of the services hereunder.

EXHIBIT A

SIGNALING SYSTEM 7 (SS7) INTERCONNECTION COMPENSATION

1. **A-Link Charges**

1.1 These charges represent access to BellSouth's SS7 network for signaling capabilities and do not preclude charges for additional features and services. For each SS7 Signaling A-Link termination on a BellSouth Signaling Transfer Point (STP) switch for the purpose of ITC interconnection with the BellSouth SS7 network, the following charges to ITC shall apply.

1.2 Charge: $492.05 per A-Link per month.

2. **B-Link Charges**

2.1 This Attachment is intended to cover charges related to access to BellSouth's SS7 network for signaling capabilities and does not preclude charges for additional features and services. There shall be no charge by either Party for B-Link terminations provided the links are used solely for ILEC Public Switched Network (PSN) traffic. If at any time it is determined the links are used for any other traffic type, BellSouth shall charge ITC and ITC shall pay BellSouth all applicable link, port, and usage charges for the period of time ITC uses the SS7 links in violation of this Attachment.