



ATIS-0300084

Network Interconnection Interoperability Forum,
(NIIF)

Telecommunications Relay Service (TRS)



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1.0 BACKGROUND

1.1 Introduction

This paper presents the current industry understanding regarding network technical issues associated with the implementation of Telecommunications Relay Service (TRS). Of particular concern is the issue of carrier of choice -- the ability of the TRS user to specify the carrier the user wishes to transport the call, and the manner in which this feature can be provided. This effort is a result of activity initiated at the Industry Carriers Compatibility Forum (ICCF). It represents the current industry view and may be subject to change. Any such changes, including modifications or additions to the document will be made under the direction of the Network Interconnection Interoperability Forum (NIIF).

Although the technical arrangements described in the document should be considered the product of industry consensus regarding the ultimate network solution to the stated issues, there should be no inference relating to the implementation of the proposed architectures by any TRS service provider. That is, the decision to implement these arrangements, and the timetable in which such arrangements should be deployed, is likely to be based on business and regulatory concerns, and will vary accordingly. Moreover, nothing in this document precludes the use of alternative arrangements which may include some or none of the features described.

1.2 Telecommunications Relay Service

Telecommunications Relay Service (TRS) is a telephone transmission service that provides the ability for an individual who has a hearing or speech disability to engage in communication by wire or radio with a hearing individual in a manner that is functionally equivalent to the ability of an individual who does not have a hearing impairment or speech impairment.

TRS includes services that enable two-way communication between an individual who uses a Text Telephone (TT) or other non-voice terminal and an individual who does not use such a device.

1.3 Key Regulatory and Legislative Rulings

Several regulatory and legislative actions have mandated that TRS be made available. Most significant of these actions is the Americans with Disabilities Act (ADA) which prescribes that *"Each common carrier ... shall ... provide ... TRS, individually, through designees, through a competitively selected vendor, or in concert with other carriers."* In addition, the ADA directs the FCC to prescribe regulations that establish functional requirements, guidelines, and operations procedures for TRS.

In its Order in Docket 90-571, the Commission provided such regulations. Key among them is a technical standard that prescribes equal or equivalent access to interexchange carriers. Specifically, it is stated that “*TRS users shall have access to their chosen interexchange carrier through TRS, and to all other operator services, to the same extent that such access is provided to voice users.*”

1.4 Carrier of Choice

In each state, TRS is provided, after a selection/certification or competitive bidding process, by a single carrier, either an interexchange carrier (IC), a local exchange company (LEC), or other (usually non- profit) organization. The regulation prescribing equal access for TRS has been interpreted to require that the TRS provider offer the TRS user the ability to designate the carrier to transport the call. Accordingly, the TRS provider must establish the technical capability and the administrative procedures to route the call to the designated transport carrier. Similarly, the transport carrier must be able to recognize the TRS call, complete the call to its destination, and obtain sufficient call detail information to accurately rate and bill the call. With such an arrangement, the established connection will link the calling party to the called party, through the TRS platform and the facilities of the transport carrier. The Communications Assistant (CA) of the TRS provider will provide the relay function.

2.0 NEEDS AND OBJECTIVES

2.1 Rating of TRS Calls

Several State Commissions have mandated that TRS calls be discounted. Such discounts must be provided not only by the TRS provider, but also by any other carrier that is involved in transporting the TRS call. Accordingly, if a call is routed by the TRS provider to a transport carrier, the transport carrier must be able to identify the call as a TRS call in order that the appropriate discount can be applied.

2.2 Efficiency

It is desirable that the TRS provider be able to route the call to the designated transport carrier in as efficient a manner as possible. The need for such efficiency implies that the transport carrier receive, through available network signaling, all necessary information to complete the call. This information includes the identification of the call as a TRS call, the end user calling number, and the called number. Moreover, it is desirable that any additional information further describing the nature of the calling line (e.g., hotel/motel, payphone, etc.) be provided.

Calls not requiring operator assistance should be routed to the transport carrier's non-operator switch. That is, calls where alternate billing (card, collect, third party) is not requested by the calling party should not involve the operator services position of the transport carrier. When

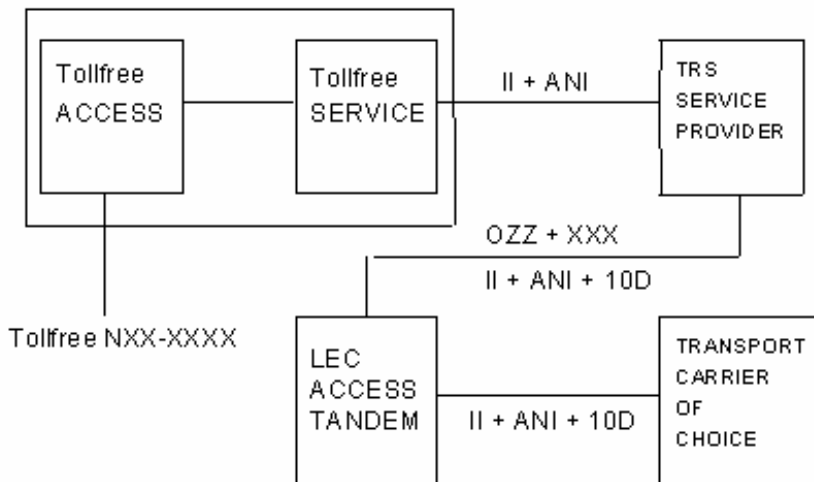
alternate billing is requested, the interaction between the CA and the transport carrier operator should be kept to a minimum. Again, as much information as possible should be provided to the operator services position of the transport carrier through network signaling.

Efficient provision of routing to the transport carrier will minimize the call set-up time associated with the TRS call. Minimal call set-up is necessary to better meet the requirement of functional equivalency to non TRS connections.

3.0 NETWORK ARCHITECTURE

3.1 General

The suggested network architecture to effect carrier of choice is shown in the figure below. A key feature of the architecture is the capability within the TRS platform which allows the platform to outpulse in an equal access signaling format to a LEC access tandem switch. This capability takes advantage of known access network capabilities and arrangements to effectively provide connectivity to the requested transport carrier.



NETWORK ARCHITECTURE FOR CARRIER OF CHOICE

It is recognized that some of the capabilities described as well as the necessary access trunking are not now in place and will have to be deployed to comply with the proposed architecture. Further, it is understood that this network architecture cannot be used for certain calls (see Section 7.5). Finally, as stated in the introduction (Section 1.1) the decision to implement these arrangements and the timetable in which these arrangements are deployed, are likely to be based on business and regulatory concerns.

3.2 Access to the TRS Platform

Connection of the end user (calling party) to the TRS platform is typically provided through the use of an Toll-free number. The Toll-free service which routes the call to the platform should be configured to deliver to the TRS provider the 10 digit calling number (ANI). In addition to the calling party number, the Toll-free service should deliver to the platform the ANI II digit pair associated with the calling line.

3.3 Selection of Carrier of Choice

After connection to the TRS platform, the end user will provide to the CA -- either verbally or through use of a TT -- the called number, the type alternate billing required, if any, and, if desired, the carrier the caller wishes to route the call.

3.4 The Use of MF Feature Group D Signaling

The TRS Platform will route the call to the requested carrier by generating an equal access (FG D) signaling message to an appropriate, originating LEC access tandem switch. Originating FG D signaling through an access tandem uses a two stage outpulsing sequence with the first stage of the form "OZZ XXX" where OZZ is used to specify a particular trunk group and XXXX is the carrier code. The calling number (ANI) including the ANI II digits and the called number are provided in the second stage of outpulsing.

3.4.1 The Use of Unique ANI II Digit Pairs

It is necessary that the carrier of choice (the transport carrier) recognize the call incoming to its network as a TRS call. To effect this recognition through network signaling, new ANI II digit pairs must be defined and assigned to identify TRS calls. Because the transport carrier requires information regarding the nature of the calling line, reflecting, for example, the need for a particular billing treatment, multiple ANI II digit pairs are necessary. Accordingly, the use of these new ANI II digit pairs will identify the incoming call as a TRS call with no billing restrictions (i.e., bill to the calling number) or a TRS call in which some alternate billing arrangement must be used. Specific definitions of these new ANI II digit pairs are given in Section 6, below.

It should be recognized that the ANI II digit pair sent by the TRS platform to the carrier of choice will not be the ANI II digit pair originally associated with the calling line and initially received by the TRS platform. Rather, the TRS Platform must map the ANI II pair of the calling party's line to one of the new ANI II digit pairs assigned for TRS use.

3.5 The Use of SS7 Feature Group D Signaling

The TRS Platform will route the call to the requested carrier by generating an Initial Address Message (IAM) containing the appropriate parameters to enable the originating LEC access

tandem to route the call to the appropriate IXC. The 0ZZ XXXX will be sent in the Transit Network Selection (TNS) parameter and, as in the FGD in-band signaling above, the 0ZZ will indicate the trunk group type (Circuit ID) and XXXX will contain the Carrier Identification Code (CIC) of the preferred carrier. The LEC tandem will use the information in the TNS to route the call to the appropriate IXC trunk group and to indicate the type of call (1+, 0+, etc.). Since the TNS is not passed from the tandem to the IXC, the NIIF recommends the Carrier Information Parameter (CIP) of the IAM must contain the CIC of the Preferred Inter-exchange Carrier (PIC).

The Pre-subscribed or Casual Call status of the call is indicated in the Carrier Selection Parameter (CSP). The NIIF recommends utilizing a CSP value of 7 for TRS calls. CSP value of 7 is defined as "Selected carrier identification pre-subscription unknown (verbal) instructions from the calling party." Further information on CSP values can be found in T1.113, Signaling System No. 7 (SS7) - Integrated Services Digital Network (ISDN) User Part.

The NIIF recommends that the TRS platform pass the Jurisdiction Information Parameter (JIP). Currently, the TRS platform does not send JIP but TRS providers are willing to have their platforms pass JIP if it was sent on the inbound call. JIP should not be created by the TRS platform for a call where the originating office was not capable of sending it. The Originating Line Information (OLI) codes are the two-digit codes providing indication of the type of station making the call. These codes are referred to variously as "ANI II digits", "Info Digs", and "II digits", and are described below for TRS use. The NIIF recommends that the IAM sent by the TRS platform be populated in accordance with T1.113, Signaling System No. 7 (SS7) - Integrated Services Digital Network (ISDN) User Part.

3.6 Call Flows

The following are descriptions of the call processing necessary to establish and complete a TRS call.

3.6.1 TRS Call Billed to the Calling Line

Consider a TRS call made from a residence line where the caller wishes to have the call completed over a specific carrier's network, and not the network of the TRS provider. Moreover, the call is to be billed to the calling line.

Typically, the calling party would access the TRS Platform by dialing an Tollfree number. The call would be completed and, because of the manner in which the (Tollfree) service was provisioned, the TRS platform would receive the calling party number (ANI) and the associated II digits (in this case 00). The calling party will communicate with the CA, informing the CA of the called number and the choice of carrier. The CA, recognizing (through the II digits) that call is made from an unrestricted line and that no alternate billing (e.g., card, collect) has been requested would assume that the call is to be billed to the originating line.

The CA would initiate the call to the designated carrier causing an equal access signaling message to be transmitted from the TRS platform to the appropriate LEC access tandem switch. Contained within the signaling message is the information indicating the carrier to which the call should be routed. The second stage of the signaling message contains both calling and

called party number, including the new II digits 60 indicating that the call is a TRS call and that there are no billing restrictions on the calling line. The call would be completed by the transport carrier with the necessary call detail indicating the use of TRS, thereby permitting the transport carrier to apply the appropriate rate treatment.

3.6.2 TRS Call with Alternate Billing

A call will be designated as an alternate billed call either because the calling party has requested such treatment or the CA, based on an indication from the calling line II digits, recognizes that the call cannot be treated as sent paid. In either event, the call would reach the TRS platform as previously described in Section 3.6.1.

The CA, after determining that alternate billing is required, will initiate the call to the specified carrier as if the call were dialed 0+. Carrier identification will again be realized through the first stage of FG D signaling through a LEC access tandem. The calling party number information will contain the necessary II digit pair indicating a TRS call from either a restricted or unrestricted line. Because the call was dialed 0+, the call will be routed to the operator services position of the designated carrier where the appropriate call treatment (card, collect, third party) can be provided.

4.0 CAPABILITIES OF THE TRS PROVIDER

As indicated in the above call flows, the TRS platform and/or the CA must provide several specific capabilities in order to effect the desired call processing.

- Receive the ANI of the calling line
- Receive and interpret the ANI II digits of the calling line
- Recognize the routing needs (e.g., 1+, 0+) of the calling party
- Map the calling line II digits to the TRS II digits as appropriate
- Route the call to the carrier of choice using FG D signaling through a LEC access tandem switch. (Access facilities to connect the TRS platform to the appropriate access tandem must be in place)
- Provide all necessary additional information to the carrier of choice (e.g., card number, collect, third party)

In addition, it is the responsibility of the TRS provider to inform all ICs operating in a given state (where the TRS provider offers service) of the location of specific access tandem switches

through which "carrier of choice" traffic will be distributed. Moreover, the TRS provider is also responsible for informing the industry relative to the activation by the TRS provider of any newly assigned ANI II digit pairs which will necessarily be forwarded to a selected carrier of choice.

5.0 CAPABILITIES OF THE TRANSPORT CARRIER

Similarly, the transport carrier must also support several features to allow the efficient implementation of carrier of choice.

- Provision access facilities from the appropriate access tandems
- Receive FG D signaling at all POPs designated to collect TRS traffic
- Receive and recognize the unique TRS II digits
- Record the necessary call detail information for rating and billing

6.0 RESPONSIBILITIES OF THE LEC

The designated architecture for carrier of choice requires that the TRS provider route traffic through a LEC access tandem switch for delivery to the end user's chosen carrier. Accordingly, access facilities should be made available by the LEC to provide the necessary connectivity from the TRS platform to the designated access tandem.

In addition, the LEC should understand that the deployment of the recommended architecture requires that access recording capability be available at the tandem switch which receives traffic from the TRS provider and routes that traffic to the transport carrier. To the extent that access recording capabilities are not available, their development should be considered.

7.0 NEW ANI II DIGIT PAIRS FOR TRS

It is suggested that three new II digit pairs be assigned to permit the efficient implementation of TRS and, in particular, carrier of choice.

7.1 TRS II Digit Pair 60

ANI II digit pair 60 indicates that the associated call is a TRS call delivered to a transport carrier from a TRS provider and that the call originated from an unrestricted line (i.e., a line for which there are no billing restrictions). Accordingly, if no request for alternate billing is made, the call will be billed to the calling line.

7.2 TRS II Digit Pair 67

ANI II digit pair 67 indicates that the associated call is a TRS call delivered to a transport carrier from a TRS provider and that the call originated from a restricted line. Accordingly, sent paid calls should not be allowed and additional screening, if available, should be performed to determine the specific restrictions and type alternate billing permitted.

7.3 TRS II Digit Pair 66

ANI II digit pair 66 indicates that the associated call is a TRS call delivered to a transport carrier from a TRS provider, and that the call originates from a hotel/motel. The transport carrier can use this indication, along with other information (e.g., whether the call was dialed 1+ or 0+) to determine the appropriate billing arrangement (i.e., bill to room or alternate bill).

7.4 ANI II Digit Mapping

ANI II digit pairs associated with the calling line and received by the TRS platform will have to be mapped into the three II pairs assigned for TRS).60, 66, 67. The following table suggests such a mapping.

ORIGINAL II PAIR	DESCRIPTION	TRS II PAIR	DESCRIPTION
00	UNRESTRICTED	60	UNRESTRICTED

01	MULTIPARTY	60	UNRESTRICTED
02	ANI FAILURE	67	RESTRICTED ⁱ
06	HOTEL/MOTEL	66	HOTEL/MOTEL
07	SPECIAL OPERATOR HANDLING	67	RESTRICTED
20	AIOD	60	UNRESTRICTED
23	COIN/NON-COIN UNKNOWN	67	RESTRICTED
24	Tollfree SERVICE	67	RESTRICTED
25	Tollfree	67	RESTRICTED
27	COIN	67	RESTRICTED
29	PRISON / INMATE	67	RESTRICTED
61	CELLULAR	67	RESTRICTED
62	CELLULAR	67	RESTRICTED
63	CELLULAR	67	RESTRICTED
70	COCOT	67	RESTRICTED
93	VIRTUAL NET	60	UNRESTRICTED

8.0 Additional Technical Issues

Several additional technical issues must be recognized by both the TRS providers and the transport carriers.

ⁱ Typically, when ANI failure occurs, the call is directed to an operator for collection of the calling party number. If the calling party number is successfully obtained, and if it is determined that the calling line is unrestricted, the call may be forwarded from the TRS platform as an unrestricted call (i.e., with ANI II AA).

8.1 Trunking to the LEC Access Tandem Switch

The previously described call flows indicate that the TRS provider will deliver traffic to the designated carrier of choice through a LEC access tandem switch. Because the TRS platform may be physically distant from the state it serves, an issue that must be addressed is the location of the LEC access tandem to which the TRS platform will deliver carrier of choice traffic. It is possible that such traffic could be offered at a tandem switch and delivered to the designated carrier outside the state in which the call was made.

If this were the case, at least two difficulties might arise. First, the information provided to the transport carrier necessarily includes the calling party number which indicate the NPA code associated with the originating location. Accordingly, if this call is delivered to a Point of Presence (POP), and ultimately to a switch of the transport carrier in a state far distant from the location of the calling party, that switch will receive and must recognize "foreign" NPA codes which it typically is not expecting. Therefore, screening in these switches, at least on those trunk groups which receive TRS calls, will have to allow such "foreign" codes.

Second, the ANI based screening required to determine specific call treatment (e.g., collect only) or to validate 1+ calling from hotels is based upon internal databases which are regionally deployed. Accordingly, if the call is delivered to the transport carrier at a location distant from the calling party, the relevant information necessary to perform screening may not be present.

It is therefore suggested that routing arrangements be considered so that calls routed from the TRS provider to the designated carrier of choice are delivered to that carrier from a LEC access tandem switch in the state from which the call originated, preferably from the switch that serves the calling NPA.

8.2 Tollfree Database Access

There are two situations where Tollfree Database Access will provide to the TRS platform an ANI II digit pair which does not directly describe the characteristic of the originating line, or will change the II pair associated with the calling line. II 23 will be received by the TRS platform if the access provider cannot determine if the originating line is coin or non-coin. Receipt of II 23 will occur, for example, on some calls originating from non equal access end offices.

Upon receipt of II 23 the CA should attempt to obtain the full (10 digit) ANI of the calling party and the nature of the calling line. If the CA determines that the call can be billed to the calling line, the ANI II digit pair forwarded to the transport carrier could be that associated with a TRS unrestricted call. If the CA is not certain of the nature of the calling line, or is unwilling to take responsibility for that decision, the call should be forwarded to the transport carrier with the ANI II digit pair for a TRS restricted call.

ANI II digit pair 24 is used to indicate that Tollfree access includes a POTS number translation and will therefore be received by the TRS platform on every call if the Tollfree service provider has selected this option from the Tollfree access supplier. If II 24 is received, the CA should again attempt to determine the nature of the calling line. More appropriately, the TRS provider should request of its Tollfree service provider that POTS translation not be used.

8.3 Inaccessibility of the Designated Carrier

Clearly, the designated transport carrier of choice to which the TRS provider will direct the call must have a Point of Presence (POP) in the area from which the call originates, and must have in place access facilities from the tandem switch to which the TRS provider routes the call. If such access facilities are not in place, the call cannot be directed to the transport carrier and should be routed to the appropriate announcement.

It should be noted that announcement capability may not be available at all LEC tandem switches that will receive TRS (carrier of choice) traffic, possibly causing calls routed to unavailable carriers to terminate in reorder, without explanation to the calling party. Accordingly, it would be advisable for the TRS provider to be aware of the ICs that serve a given state (or area within a state) and are available to receive TRS traffic. Calling parties selecting a carrier known to the TRS provider to be unavailable from the caller's area would be so informed by the TRS provider and asked to make another choice.

8.4 Access to the LEC Operator

Situations may arise in which a calling party making a TRS call needs to access the LEC operator for assistance. Accordingly, the TRS platform should incorporate and support existing interconnection arrangements (e.g., operator inward dialing) and procedures to accommodate this potential need.

8.5 Transfer of TRS IntraLATA Calls to the LEC

As previously explained (Section 1.4) there may be situations where, subject to regulatory directives, intraLATA calls handled by a TRS provider must be routed to the LEC for completion. The network solution described herein cannot be used for such calls. Alternatively, intraLATA calls could be forwarded to the LEC simply by sending the called number to the LEC tandem or end office switch. (If calls are routed by the TRS provider to the LEC for completion, the calls may have to be delivered to a tandem switch in the LATA in which the call originated). Associated billing arrangements, if required, would have to be accommodated on an individual case basis. In any event, should LEC completion of intraLATA TRS calls be required (in some areas, state commissions have authorized TRS providers to complete intraLATA traffic) the arrangements necessary to accommodate this need should be developed through one-on-one negotiations between the TRS provider and the LEC.

8.6 Coin Sent-Paid Calls

A recent FCC Order (CC Docket 90-571, released 2/25/93) ruled that TRS must accommodate coin sent-paid calls. Current TRS access arrangements (i.e. Tollfree service) and TRS platform capabilities cannot adequately support coin sent-paid traffic as the necessary coin control signaling features, required to monitor the deposit and collection of coins, are not available.

Moreover, the difficulties are compounded if the call is handed off from the TRS provider to a transport carrier. In this situation, the coin control capabilities would necessarily have to be transferred to the transport carrier -- a capability that again, is not available.

Further, full support of coin sent paid TRS traffic would require a non-voice interface for coin control signaling and the development of the associated industry standards. In addition, changes in customer premises equipment (i.e., coin telephones) would be required to support TT usage on coin calls.

If an industry technical solution for the accommodation of TRS coin sent-paid calls is developed, this document will be amended to describe the arrangement.

9.0 Alternate Arrangements

A TRS provider and/or a transport carrier, along with the LEC, may choose not to implement the above described capabilities. Although less efficient, there are alternatives to the network solution which could provide the basic carrier of choice feature.

Simplistically, upon a calling party request for transport service from a designated carrier, the TRS provider could launch the call to that carrier using 101XXXX access. The call would be routed to the carrier of choice with the ANI and the ANI II digits of the TRS platform. The transport carrier could identify calls from a TRS provider based upon the ANI, and collect the call detail for those calls in a "downstream" process. Call detail information, recorded by the TRS provider, including calling party number could then be provided to the transport carrier, allowing calls completed over the transport carrier's network to be associated with the appropriate calling party. Accordingly, the calls could be rated and billed.

This arrangement would permit a TRS provider to route the call to the calling party's carrier of choice, and would not require the network modifications and access trunking additions described above. This arrangement, however, requires the transfer of billing information outside the normal, automated processes. The use of essentially manual input to an otherwise automated process is administratively burdensome and is prone to result in lost data and/or errors. Moreover, the absence of relevant information (e.g., calling party number, relevant II digits) in real time during call processing could inhibit the transport carrier's ability to properly treat the call, and could potentially increase the possibility of fraud. Accordingly, at least for use in the long term, this alternate arrangement is not recommended.