



**Alliance for Telecommunications
Industry Solutions**

ATIS Standard

ATIS-0300081

**Network Interconnection Interoperability Forum,
(NIIF)**

**Wireless Interconnection Types and Dial Patterns
(Formerly NIIF 0011)**



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ATIS-0300081, *Wireless Interconnection Types and Dial Patterns*

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ELEMENTS OF INTERCONNECTION:

Three basic elements of wireless interconnection to the PSTN are transport via transmission systems (DS-1, DS-3, OC-n), trunks and telephone numbers. Each DS-0 acts as a trunk in the context. Telephone numbers are allocated to wireless service providers, just as with wireline service providers, through NeuStar, the North American Numbering Plan Administrator (NANPA).

Calls originating from a wireline telephone to a wireless subscriber must be routed through the wireline service provider's Central Office (CO) where the wireless service provider's interconnection was originally obtained. These calls are then routed from the wireline service provider to the wireless service provider's Mobile Switching Center (MSC) over the actual interconnection links.

Switching of wireless calls takes place at the MSC. Wireless interconnections to the PSTN can occur from either a cell-site location or an MSC location. If a desired interconnection can be accomplished from a cell-site that is closer to a wireline service provider point of presence (POP) than the MSC, it makes more sense from a cost perspective to place the interconnection into the cell-site. The interconnection traffic then is backhauled to the MSC for switching.

INTERCONNECTION TYPES:

TYPE 1

Type 1 interconnection describes an architecture whereby the wireless service provider is connected to the local exchange carrier (LEC) via an end-office trunk-side connection with line treatment. The signaling from the wireless service provider to the LEC does not identify the Mobile Directory Number (MDN). The ANI II digits and the ANI number must be supplied by the LEC as part of the signaling protocol for the trunks to the IXC (either direct trunking or via the access tandem).

This interconnection could be ordered for marketing purposes, simply to obtain local-access telephone numbers or a local presence in a specific geographic area. This strategy applies especially in rural areas. The line ranges used by the wireless service provider to serve its customers are actually owned by the wireline service provider and assigned to the wireless service provider. Like other types, the switching of calls takes place at the MSC.

In some rural areas, it might be necessary to order a Type 1 because it is not cost-effective to order other types of interconnection, such as Type 2A. For example, in a remote but relatively large community, a wireless service provider would definitely want to order local telephone numbers. That way, calls between wireless phones and wireline telephones would be carried and rated at the cheapest possible rate, while simultaneously appearing as local numbers to the local population.

Type 1 interconnections also carry 9-1-1 traffic, 411 traffic, 0+ traffic (credit card calls), 0- traffic (calls to the operator), and toll free traffic. Type 1 interconnections also are capable of carrying traffic to any destination LATA-wide, but Type 2A interconnections are the preferred method for transporting these calls because the rates are usually cheaper to terminate a call to a wireline telephone.

Type 1 interconnections also can be used for traffic that needs to be routed to an IXC when the destination of the call is inter-LATA or interstate. When the amount of traffic in a given wireless market is not great enough to justify a dedicated DS1 circuit, which ties the wireless service provider directly to an IXC's POP, wireless traffic is routed to the IXC over a Type 1 interconnection in switched access form.

TYPE 2

Type 2 interconnections describe an architecture whereby the wireless service provider acts as an end-office and has trunk-side connections to LEC access tandem, or connections direct to the IXC. The trunk signaling protocol normally includes the forwarding of the ANI II digits and the MDN in the ANI field. It is recommended that for calls within the NANP, ten digits (including NPA) be sent to the IXC by the wireless service provider.

TYPE 2A

A Type 2A interconnection consists of a trunk group between a wireless service provider's cell and MSC to a wireline service provider tandem, known as an Access Tandem. Tandems serve as hubbing centers for two or more end offices in a local access and transport area (LATA).

In some instances, the local calling area for Type 2A interconnections is the entire LATA. Service providers obtain an exchange code block when procuring a Type 2A interconnection to the PSTN through the NANPA. Type 2A interconnection represents the procurement of interconnection at a wholesale rate.

Wireless terminated calls are routed to the tandem where interconnection to the wireless service provider takes place. The NXX code resides in the MSC, not the wireline service provider switch. Routing to the wireless network is based on the Local Routing Number (LRN) or the NPA-NXX code and the actual switching of wireless calls takes place at the MSC.

TYPE 2B

A Type 2B interconnection consists of a trunk group between a wireless service provider's cell or MSC, to a specific LEC end office. These interconnections are used only for local, cost-effective connection to the PSTN to terminate high volumes of traffic to specific exchange codes. They are justified based on the very volume of traffic to exchange codes at a specific end office. An example of an end office is the type of CO that offers regular home or business dial tone. The end office is the lowest link in the chain of switching systems that comprise the PSTN.

TYPE 2T

A Type 2T interconnection is a trunk group to a wireline access tandem that is used to route equal-access traffic from a wireless service provider's network to an IXC provider's POP. Equal access provides wireless subscribers the opportunity to presubscribe to a given IXC.

This type of interconnection provides wireless customers access to all long-distance providers via a Feature Group-D trunk, which carries the ANI of the calling party (wireless subscriber), the CIC code of the appropriate IXC (101XXXX) and the dialed number (information digits).

ANI II DIGITS:

ANI II digit pairs should be used to identify wireless traffic when the technical capability exists in the wireless, local exchange carrier, and IXC switches.

The pairs below are used for wireless.

ANI II Digit Pair 61

Wireless (Type 1) - The "61" digit pair is to be forwarded to the IXC by the local exchange carrier for traffic originating from a wireless service provider over type 1 trunks. (Note: ANI information accompanying digit pair "61" identifies only the originating wireless system, not the MDN placing the call.)

ANI II Digit Pair 62

Wireless (Type 2) - The "62" digit pair is to be forwarded to the IXC by the wireless service provider when routing traffic over type 2 trunks through the local exchange carrier access tandem for delivery to the IXC. (Note: ANI information accompanying digit pair "62" identifies that a MDN is placing the call but does not necessarily identify the true call point of origin.)

ANI II Digit Pair 63

Wireless (Roaming) - The "63" digit pair is to be forwarded to the IXC by the wireless subscriber "roaming" in another wireless network, over type 2 trunks through the local exchange carrier access tandem for delivery to the IXC. (Note: Use of "63" signifies that the "called number" is used only for network routing and should not be disclosed to the wireless subscriber. Also, ANI information accompanying digit pair "63" identifies that the MDN is forwarding the call but does not necessarily identify the true forwarded-call point of origin.)

THE FOLLOWING TABLE SHOWS THE DIAL PATTERNS FOR CALLS ORIGINATED BY A WIRELESS SUBSCRIBER INSIDE THE HSA (HOME SERVING AREA), OUTSIDE THE HSA WITHIN THE WORLD ZONE 1 AND OUTSIDE WORLD ZONE 1.

	DIAL PATTERNS FOR HOME SUBSCRIBER WITHIN THE HSA	DIAL PATTERNS FOR ROAMING SUBSCRIBER OUTSIDE THE HSA BUT WITHIN WORLD ZONE 1	DIAL PATTERNS FOR ROAMING OUTSIDE WORLD ZONE 1 SUBSCRIBER
Local Dialing:	NXX+XXXX NPA+NXX+XXXX 1+NPA+NXX+XXXX	N/A NPA+NXX+XXXX 1+NPA+NXX+XXXX	
Toll Dialing: PIC not supported. Default to Serving Carrier's Long Distance Carrier of choice.	NPA+NXX+XXXX 1+NPA+NXX+XXXX	NPA+NXX+XXXX 1+NPA+NXX+XXXX	
Toll Free Dialing:	1+8YY+NXX+XXXX 1+700+ NXX+XXXX	1+8YY+NXX+XXXX 1+700+ NXX+XXXX	
International Dialing:	011+CC+[NDC] + N(S)N N/A N/A	011+CC +[NDC] + N(S)N N/A N/A	(Direct Dial) 00+1+NXX+XXX +XXXX (Direct Dial to U.S.)
Customer Care: Route to Home Carrier	611 *611 #611	611 *611 #611	
Directory Assistance:	411 1+411	411 1+411	

	*411	*411
	#411	#411
	555+1212	555+1212
	NPA+555+1212	NPA+555+1212
	1+NPA+555+1212	1+NPA+555+1212
Operator Services:	0	0
	0+NXX+XXXX	N/A
	0+NPA+NXX+XXXX	0+NPA+NXX+XXXX
	01 + CC+[NDC] + N(S)N	01 + CC+[NDC] + N(S)N
Emergency 9-1-1: Route to local PSAP	9-1-1	9-1-1
	*9-1-1	*9-1-1
	#9-1-1	#9-1-1
CAC Dialing: Route to recorded announcement	101XXXX+NPA+NXX+XXXX	101XXXX+NPA+NXX+XXXX
(CAC dialing may not be available in all areas)	101XXXX+1+NPA+NX X+XXXX	101XXXX+1+NPA+NXX+XX XX
	101XXXX+1	101XXXX+1
	101XXXX+011	101XXXX+011
Wireless National Security/Emergency Preparedness (NS/EP) calls:		
1. GETS	710+NCS+GETS	710+NCS+GETS

	(0/1)+710+NCS+GETS	(0/1)+710+NCS+GETS	
	N/A	N/A	00+1+710+NCS+GETS (Overseas to U.S.)
2. WPS	*272+NXX+XXXX	*272+NPA+NXX+XXXX	
	*272+NPA+NXX+XXX X	N/A	
	*272+(0/1)+NPA+NXX +XXXX	*272+(0/1)+NPA+NXX+XXX X	
	*272+011+ CC+[NDC] + N(S)N	*272+011+ CC+[NDC] + N(S)N	
3. WPS+GETS	*272+710+NCS+GETS	*272+710+NCS+GETS	
	*272+(0/1)+710+NCS+GETS	*272+(0/1)+710+NCS+GETS	
	*272+710+NCS+GETS (from U.S. to Overseas)	*272+710+NCS+GETS (from U.S. to Overseas)	
4. UIFN	N/A	N/A	There are UIFN toll free access numbers from Overseas to U.S. using AT& T, MCI and Sprint

ACRONYMS & DEFINITIONS:

Access Tandem - The term "Access Tandem" denotes an Access Service Provider switching system that provides a concentration and distribution function for originating or terminating traffic between end offices and a customer's location

CAC - Carrier Access Code

CIC - A three digit number used with Feature Group B and D to access a particular IXC's switches services from a local exchange line.

CLASS 3 - IXC – Hierarchical interconnection for Class 4 and optional Class 5 switches.

CLASS 4 - Tandem Office-Toll Office – Interconnection for Class 5 switches and long distance via Class 3 IXCs. Optional direct connection to higher volume Class 4 sites. A Class 4 may also serve as a Class 5 CO.

CLASS 5 - Central Office-End Office – Connection to local Customer Premise Equipment and local switching. Capacity typically is up to 100,000 lines, 1 to 10 NXX.

CO - Central Office – One Class 5 switch with lines to customer locations. Usually less than 100,000 telephone lines per Central Office. COs are usually owned and operated by LECs or BOCs. COs have connections to Tandem (Class 4 Toll Offices) and are often connect directly to other COs and IXCs. A CO is a major equipment center designed to serve the communications traffic of a specific geographic area. CO coordinates are used in mileage calculations for local and interexchange service rates. A Non-Conforming CO is one that does not, yet, supports Equal Access.

GETS - Government Emergency Telecommunications Service is a White House-directed emergency telephone service provided by the National Communications System (NCS) which supports federal, state, local, and other authorized users. GETS provides emergency access and priority processing in the local and long distance segments of the Public Switched Telephone Network (PSTN). GETS is intended to be used in an emergency or crisis situation when the PSTN is congested.

EA-CAC DIALING - Recommended treatment for originations where wireless carrier offers Equal Access dialing (currently 101XXXX) but not IXC pre-subscription. In absence of 101XXXX dialing, the wireless carrier designated IXC may be used.

EA-PIC - Recommended treatment for originations where wireless carrier offers both Equal Access dialing and IXC presubscription.

FG-A - Feature Group A – (Line Side Connection) One Dial-Up Network Circuit via 2-Wire Connection.

FG-B - Feature Group B – (Trunk Side Connection / CAC = 950-XXXX) One Dial-Up Network Circuit via 4-Wire Connection (Higher quality than FG-A, extra wires for signaling) ANI (caller's phone number) Service is optional.

FG-C - Feature Group C – (Traditional Toll Trunk Connection) Used primarily by AT& T- This feature group was used prior to the implementation of Equal Access (1+ presubscription) beginning in 1984.

FG-D - Feature Group D – (Equal Access Trunk Side Connection) One 1+ Network Circuit via 4-Wire Connection. Also used for 800 Inbound WATS and Calling Card Services. Provides the "ANI" (caller's phone number) for billing purposes.

HAS - Home Service Area

IXC - Interexchange Carrier providing long distance phone service between LECs & LATAs

LATA - Local Access Transport Area

LEC - Local Exchange Carrier-Local or regional telephone company that owns and operates lines to customer locations and central office switches.

MDN - Mobile Directory Number-The 10-digit billing telephone number assigned to the wireless subscriber in the NPA-NXX-XXXX format.

MSC - Mobile Switching Center-Also known as MTSO (Mobile Telephone Switching Office) and MTX (Mobile Telephone Exchange).

NCS - National Communications System was established by E.O. 12472 and consists of 23 Federal Government Organizations whose mission is to: assist the President, the National Security Council, the Director of the Office of Science and Technology Policy and the Director of the Office of Management and Budget in (1) the exercise of the telecommunications functions and responsibilities, and (2) the coordination of the planning for and provision of national security and emergency preparedness communications for the Federal government under all circumstances, including crisis or emergency, attack & recovery and reconstitution.

NON-EA - Recommended treatment for originations where wireless carrier does not offer Equal Access dialing or IXC pre-subscription.

NS/EP - National Security and Emergency Preparedness telecommunications services are used to maintain a state of readiness or to respond to and manage any event or crisis (local, national, or international) which causes or could cause injury or harm to the population, damage to or loss of property, or degrades or threatens the NS/EP posture of the United States.

PIC - Primary Interexchange Carrier – The IXC that 1+ calls is routed to.

POP - Point of Presence - The physical access location interface between a local exchange carrier and an Interexchange Carrier fiber network. The point to which the telephone company terminates a subscriber's circuit for long distance service or leased line communications.

PSAP - Public Safety Answering Point

REC ANN - Recorded Announcement with further information, provided by the service provider.

UIFN - Universal International Freephone Number (UIFN) enables an International Freephone Service (IFS) customer to be allocated a unique freephone number(s) that is the same throughout the world. These international numbers allow toll free calls to the US. GETS UIFNs use AT&T, MCI and Sprint.

VMSC - Visited MSC-A billing telephone number for the MSC that the roamer is visiting.

WPS - Wireless Priority Service is a FCC compliant priority service administered by the NCS. WPS is the wireless complement to the wireline Government Emergency Telecommunications Service. WPS

provides priority access, priority egress, and priority call processing of telephone calls in the wireless portion of the PSTN. WPS is authorized for key personnel to use as they perform their NS/EP mission when the wireless network is congested.