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3RD GENERATION
PARTNERSHIP
PROJECT 2
"3GPP2"

Answer Hold (Stage 1)

Revision: 0

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FOREWORD

This Interim Standard contains recommendations for supporting the wireless subscriber feature “Answer Hold (AH)”.

This Interim Standard builds upon the following:

- *TIA/EIA-41-D Cellular Radiotelecommunications Intersystem Operations; Telecommunications Industry Association; 1997.*

ASSUMPTIONS

The following items are basic understandings used during the development of this document:

- The AH feature shall be applicable to all terminating voice call deliveries (e.g., unanswered voice calls in the Alerting or Call Waiting state) permitting called AH subscribers to answer a terminating call and place it immediately on hold, allowing conversation to begin at a later more convenient time.
- When the AH authorized called party activates the AH feature, the calling party shall be provided an appropriate network announcement (e.g., as defined by the service provider) indicating the call delivery is in progress.
- Terminating calls are in the answer state when AH is invoked (i.e., answer supervision is returned).
- A terminating call in the AH state shall normally remain in the AH state until:
 - the called AH subscriber retrieves the call (e.g., **SEND**).
 - the calling party disconnects.
- AH and Call Waiting (CW) authorized subscribers, active with an in progress call and with another terminating call on hold (e.g., receiving AH treatment), shall be permitted to retrieve the call in the AH state with normal CW procedures (e.g., **SEND** terminate AH treatment, place the other party on hold, connect the AH called subscriber to the calling party in the AH state, and enter the 2-way CW state).
- When the AH service has been invoked, the AH state should be maintained during all handoff processes.
- When the call is released for any reason, the AH state shall be automatically released.
- If digits are sent to the network by an MS when the MS is instructed by the user to invoke AH, the only digits sent are a prestored digit string associated to AH invocation. The contents of the MS's buffers are not sent or modified.
- A serving network shall notify served mobile stations that it supports AH so mobile stations may determine when AH may be offered as an option to the subscriber.
- The mobile station shall not offer AH as an option to the user unless the system to which the MS is registered supports AH. Additionally, the mobile station shall not offer AH as an option when alerting an idle subscriber unless the air interface currently in use supports the signaling needed for AH invocation for incoming calls to idle subscribers.
- A call in the AH state can be retrieved by a flash with or without digits.

REVISION HISTORY

Revision	Date	Remarks
1.0	July, 2000	Initial publication.
2.0	December, 2000	Second publication

EDITORIAL KEY

- a. *ANSI-41-D, ANSI-124-B* or *ANSI-664-A* totally new sections are identified via text with right hand margin "diffmarks", as:
A totally new section's text.
- b. *ANSI-41-D, ANSI-124-B* or *ANSI-664-A* new enhanced text is identified via text with "under-score" lines and right hand margin "diffmarks", as:
.. existing text new enhanced text existing text ..
- c. *ANSI-41-D, ANSI-124-B* or *ANSI-664-A* deleted existing text is identified via text with "strike-through" lines and right hand margin "diffmarks", as:
.. existing text ~~deleted text~~ existing text ..

1. INTRODUCTION

1.1 OBJECTIVE

This Interim Standard (IS) presents Stage-1 (new chapter *TIA/EIA-664-B*), Stage-2 (*TIA/EIA-41.3-D* enhancements), and Stage-3 (*TIA/EIA-41.5-D* and *TIA/EIA-41.6-D* enhancements) recommendations for supporting the Answer Hold (AH) feature use in the Wireless Radiotelephone Service.

1.2 SCOPE

This document specifies the wireless intersystem network operation enhancements required for supporting roaming subscribers with the Answer Hold (AH) feature.

1.3 ORGANIZATION

This document is organized as per *TIA/EIA-41-D* and *TIA/EIA-664-A*.

2. REFERENCES

2.1 Normative References

ANSI/T1 Standards:

TIA/EIA:

- *ANSI/TIA/EIA-41-D Cellular Radiotelecommunications Intersystem Operations*; Telecommunications Industry Association; December 1997.
- *TIA/EIA-124-B Wireless Radio Telecommunications Intersystem Non-Signaling Data Communication DMH (Data Message Handler)*; Telecommunications Industry Association; July 1999.
- *TIA/EIA-664 Cellular Features Description*; Telecommunications Industry Association; January 1996.

3. **TIA/EIA-664-A “CELLULAR FEATURE DESCRIPTIONS” MODIFICATIONS**

This section provides the Stage-1 feature description for Answer Hold (AH) according to the structure of *TIA/EIA-664-A*.

3.1 **Definitions**

(*TIA/EIA-664-001-A* page 4)

Answer Hold (AH)

See Answer Hold.

Switch Control Code (SCC)

A Switch Control Code consists of a terminating “*” preceded by the one, two, or three digits of a Switch Control Value (as in: SCV*).

Switch Control Code String (SCCS)

A Switch Control Code String is a digit string consisting of a Switch Control Code followed by a termination address (as in SCV* + termination address).

Switch Control Value (SCV)

A Switch Control Value is an integer in the range (0..255) that is used by an MS, either alone or in conjunction with a Termination Address, to control elements of the operation of certain MSC-based features.

Depending on the details of the air interface in use, an SCV may be sent by the MS to the network:

- As a Switch Control Code (constructed from the SCV) sent using the air interface’s procedures for sending generic digit strings to the network, or
- Using dedicated air interface specific protocol elements.

In either case, the SCV is always represented as an SCC when sent from MSC to MSC within the TIA/EIA-41 network.

Depending on the details of the air interface in use, an SCV and associated termination address may be sent by the MS to the network:

- As a Switch Control Code String (with the SCC portion of the SCCS constructed from the SCV) sent using the air interface’s procedures for sending generic digit strings to the network, or
- Using dedicated air interface specific protocol elements.

In either case, the SCV and associated termination address are always represented as an SCCS when sent from MSC to MSC within the TIA/EIA-41 network.

The following table defines the Switch Control Values used in this Standard:

Switch Control Values	Usage
0	Forward the incoming call to a network stored destination
16	Forward the incoming call to the destination provided by the mobile in conjunction with this code.
17	Forward the incoming call to voice mail.
18	Apply Answer Hold treatment to the incoming call (assuming an incoming call is being offered to the MS through Alerting or Call Waiting Notification).

Table X: Switch Control Value Assignments

1.2 Call Model

(TIA/EIA-664-100-B page 100-1)

For the purposes of defining feature operations and interactions within this Standard, a call model is used. This call model is based on a finite state machine. The finite state machine is driven by a set of events. These events cause the finite state machine to perform a set of actions and change the state of the finite state machine. The current call state determines how a given event may perform a different set of actions.

The following call states are defined for a mobile subscriber:

Note: the omitted existing text is retained without modification.

12.

~~13. An incoming call has been answered and immediately placed on hold, with the appropriate Answer Hold treatment being applied toward the calling party. The system is waiting for the controlling subscriber to retrieve the held call. There is no third party.~~

Note: the omitted existing text is retained without modification.

The following subscriber (and other party) actions are defined:

- A. Address: A subscriber presses the **SEND** key with termination address digits.
- C. Conferee: A conferee requests a disconnect.
- D. Disconnect: The other party (sometimes a calling party) requests a disconnect.
- E. End: A subscriber presses the **END** key.
- F. Feature: A subscriber enters a Feature Code String followed by the **SEND** key.
- G. callinG: The calling party sends one or more DTMF digits.
- H. Held: The held party requests a disconnect.
- I. Incoming: An incoming call arrives for a subscriber.
- N. aNswers: The other party answers.
- P. Period: A time period expires.
- S. Send: A subscriber presses the **SEND** key without digits.

- T. ~~Third~~: The third party requests a disconnect.
- U. ~~featUre~~ code: A subscriber enters a Feature Code String, a delimiter digit “#,” and a termination address followed by the **SEND** key
- ~~V. addressed scV: The subscriber instructs the MS to sends an SCV and associated termination address to the network.~~
- ~~W. sWitch control: The subscriber instructs the MS to sends an SCV to the network.~~

Note: the omitted existing text is retained without modification.

The following tables summarize the feature interactions in a state-action matrix for the features in this Standard:

	1	2	3	4	5	6	7	8	9	10	11	12	13
Action	Idle	Alerting	2-way	Adding on	Holding 2-way	3-way	2-way CW notification	2-way CW	Conference adding on	Conference 2-way	Conference	Conference Alerting	Answer Hold
Address and send	Basic	Basic CC	CT=3WC	CT=3WC	CT=3WC	3WC	CW	CW	CC	CC	CC	CC	AH
Conferee disconnect	N/A	CC	N/A	N/A	N/A	N/A	N/A	N/A	CC	CC	CC	N/A	N/A
other party disconnect	N/A	Basic	Basic	N/A	N/A	3WC	CW	CW	N/A	CC	N/A	CC	AH
End key	Basic	Basic ¹	Basic	CT=3WC	CT=3WC	CT=3WC	CW	CW	CC	CC	CC	CC	AH
Feature code and send	Basic Feature CC	Basic CC	Basic CC CCW MWN Feature	CC CCW MWN Feature	CT=3WC	3WC	CW	CW	CC	CC	CC	CC	AH
calling DTMF digits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hold disconnect	N/A	Basic	N/A	CC CT=3WC	CT=3WC	N/A	N/A	CW	N/A	N/A	N/A	CC	N/A
Incoming call	Basic	Basic	Basic CW	CC CT=3WC	CT=3WC	3WC	CW	CW	CC	CC	CC	CC	N/A
other party answers	N/A	N/A	Basic	N/A	CT=3WC	3WC	N/A	N/A	N/A	CC	CC	CC	N/A
period	N/A	Basic	Basic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	CC	N/A
send and no digits	Basic	Basic CC	Basic CC CT=3WC	CT=3WC	CT=3WC	3WC	CW	CW	CC	CC	CC	CC	AH
Third disconnect	N/A	N/A	N/A	N/A	CT=3WC	3WC	CW	N/A	N/A	N/A	N/A	N/A	N/A
feature code, termination address and send	Basic CC	Basic CC	CT=3WC CC	CT=3WC CC	CT=3WC	3WC	CW	CW	CC	CC	CC	N/A	AH
addressed scv	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
switch control	N/A	AH	N/A	N/A	N/A	N/A	AH	N/A	N/A	N/A	N/A	N/A	AH

¹ Some implementations may use the **END** key to activate Answer Hold.

Table 3: State-Action Matrix to Locate Feature Interactions (Part 1 of 2)



X.1 Answer Hold (AH)

(new Chapter for ~~TIA/EIA-664-XXX-B~~)

Answer Hold (AH) provides a called subscriber the capability to answer the call, but selectively delay the conversation (e.g., calls in the alerting or Call Waiting state). The incoming call is provided an appropriate network announcement to notify the calling party to please hold.

AH is also applicable to incoming calls being delivered to called AH authorized subscribers as Call Waiting (CW) calls.

AH authorized subscribers, with AH active on an incoming call, shall resolve the call in the AH state prior to originating a new outgoing call or call leg.

New incoming calls to AH authorized subscribers, with AH active on an incoming call, shall receive the appropriate busy treatment (e.g., busy tone, redirected to voice mail, etc.) for the called AH subscriber.

Applicability to Telecommunications Services

AH is applicable to voice telecommunications services.

X.1.1 Normal Procedures With Successful Outcome

Authorization

AH may be generally available or may be provided after pre-arrangement with the service provider.

De-Authorization

AH may be withdrawn at the subscriber's request or for administrative reasons.

Registration

AH has no registration.

De-Registration

AH has no de-registration.

Activation

AH shall be activated upon authorization.

De-Activation

AH shall be de-activated upon de-authorization.

Invocation

AH may be invoked when there is an un-answered incoming call while the called AH subscriber is being alerted or active in a call (e.g., MS receiving alerting treatment, MS receiving Call Waiting [CW] treatment).

Normal Operation With Successful Outcome

When the called AH subscriber has placed a calling party in the Answer Hold state, the called AH subscriber is considered busy for other incoming calls. Services applicable to a busy called subscriber should be invoked for incoming calls.

	State	Condition	The called AH mobile station is in the alerting state for an incoming call delivery.
XID	Call Party Action		System Reaction
2W 1	The called subscriber invokes the AH feature using an MS specific procedure (e.g., causing the MS to send the SCV of 18 to the network using an air interface specific mechanism).		The calling party is placed on hold, and has AH treatment applied (e.g., network provided AH announcement). Go to the Answer Hold state.

Table 1.1a: Alerting State for Answer Hold

	State	Condition	The called AH subscriber is in a 2-way conversation with the other party and call waiting notification is applied.
XID	Call Party Action		System Reaction
7W 1	The called subscriber invokes the AH feature using an MS specific procedure (e.g., causing the MS to send the SCV of 18 to the network using an air interface specific mechanism).		The calling party is placed on hold, and has AH treatment applied (e.g., network provided AH announcement). Go to the 2-way CW state.

Table 1.1b: 2-Way CW Notification State for Answer Hold

	State Answer Hold	Condition An incoming call has been answered and immediately placed on hold, with the appropriate Answer Hold treatment being applied toward the calling party. The system is waiting for the controlling subscriber to retrieve the held call. There is no third party.
XID	Call Party Action	System Reaction
13S	The controlling subscriber retrieves the held call (e.g., using an MS specific procedure), as in: [SEND] .	Ignore any accompanying digits. The held party has AH treatment removed, and the controlling subscriber is connected to the calling party. Go to 2-way state.
13A	termination address + [SEND] .	
13F	* FC + [SEND] , or	
13U	* FC + termination address + ## + [SEND] .	
13W L	The controlling subscriber retrieves the held call using an MS specific procedure (e.g., causing the MS to send the SCV of 18 to the network using an air interface specific mechanism).	The held party has AH treatment removed, the controlling subscriber is connected to the calling party. Go to 2-way state.
13E	The controlling subscriber enters [END] .	Release the controlling subscriber. Apply recall distinctive alerting toward the controlling subscriber. Optionally apply audible alerting tone toward the held party. Go to the Alerting state.
13D	The held party abandons.	Release the held party. Go to the Idle state.

Table 1.1c: Answer Hold State for Answer Hold

Call Detail Record

The system should record call detail information for the following:

- a. AH invocation events.
- b. AH usage events.

See *ANSI-124* for the specific information to be included for each element.

X.1.2 Exception Procedures or Unsuccessful Outcome

Registration

None identified.

De-Registration

None identified.

Activation

None identified.

De-Activation

None identified.

Invocation

None identified.

Exceptions While Roaming

If the system to which the MS is registered does not support AH, the mobile station display shall not indicate AH as an available option.

Exceptions During Intersystem Handoff

If handoff to a system that does not support AH occurs while the mobile station is being alerted, the mobile station display shall not indicate AH as an available option for that call while that system remains the Serving System.

X.1.3 Alternate Procedures

None identified.

X.1.4 Interactions With Other Cellular Services

Answer Hold (AH)

Not applicable.

Call Delivery (CD)

None identified.

Call Forwarding—Busy (CFB)

None identified.

Call Forwarding—Default (CFD)

None identified.

Call Forwarding—No Answer (CFNA)

None identified.

Call Forwarding—Unconditional (CFU)

None identified.

Call Transfer (CT)

When the called subscriber has placed a calling party in the AH state, CT can not be invoked.

Call Waiting (CW)

CW is invoked before AH. That is, calls arriving to a busy AH subscriber who is able to receive a second call (e.g., no other call is waiting to be answered) shall be presented to the subscriber with CW notification.

Calls arriving to a busy AH subscriber who is unable to receive a second call (e.g., another call is waiting to be answered) shall not be presented to the subscriber. The call shall be provided the appropriate default busy treatment (e.g., CFB, CFD, busy tone).

Calling Name Presentation (CNAP)

None identified.

Calling Name Restriction (CNAR)

None identified.

Calling Number Identification Presentation (CNIP)

None identified.

Calling Number Identification Restriction (CNIR)

None identified.

Conference Calling (CC)

When the called subscriber has placed a calling party in the AH state, CC can not be invoked.

Do Not Disturb (DND)

DND takes precedence over AH. A call to a subscriber with both AH and DND active shall be given DND treatment immediately and not be given AH treatment.

Emergency Services

None identified.

Flexible Alerting (FA)

Interaction between FA and AH is beyond the scope of this Standard.

Message Waiting Notification (MWN)

None identified.

Mobile Access Hunting (MAH)

Interaction between MAH and AH is beyond the scope of this Standard.

Password Call Acceptance (PCA)

None identified.

Preferred Language (PL)

None identified.

Priority Access and Channel Assignment (PACA)

None identified.

Remote Feature Control (RFC)

None identified.

Selective Call Acceptance (SCA)

None identified.

Subscriber PIN Access (SPINA)

None identified.

Subscriber PIN Intercept (SPINI)

None identified.

Three-Way Calling (3WC)

When the called subscriber has placed a calling party in the AH state, 3WC can not be invoked.

User Selective Call Forwarding (USCF) (Future)¹

For further study.

¹ User Selective Call Forwarding is not a feature currently defined. This description is retained to describe an intent of feature interaction.

Voice Message Retrieval (VMR)

None identified.

Voice Privacy (VP)

None identified.

1 SYSTEM FUNCTIONALITY

(TIA/EIA-664-801-1)

The purpose of this section is to define the characteristics of the system with respect to messages and indications to the Mobile Station (MS) and to the calling party.

The omitted existing text is retained without modification

1.5 Indications Applied Toward the Mobile Station

(new for TIA/EIA-664-801-3)

The following indications may be applied by the system toward the mobile station during normal operation and in providing the features in this Standard, as:

- a *System support for Answer Hold*