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3RD GENERATION  
PARTNERSHIP  
PROJECT 2  
"3GPP2"

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# User Selective Call Forwarding (Stage 1)

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# User Selective Call Forwarding (USCF)

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# FOREWORD

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This Interim Standard contains recommendations for supporting the wireless subscriber feature “User Selective Call Forwarding (USCF)”.

The *ANSI/TIA/EIA-41-D* recommendation upon which this Interim Standard builds is:

- *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:

- USCF shall permit authorized subscribers to redirect incoming calls to:
  - the subscriber’s network based voice mail box.
  - a network registered USCF DN.
  - one of a selection of termination addresses which are stored in the mobile station.
- USCF shall permit authorized subscribers to identify the redirection destination of incoming calls, independent of authorization for other call forwarding features (e.g., Call Forwarding Default [CFD], Call Forwarding Busy [CFB] and Call forwarding No Answer [CFNA]).
- USCF shall not permit identifying special access numbers as the redirection destination for incoming calls (e.g., Emergency Services [e.g., 9-1-1], Operator Services [e.g., 0+], Service Codes [e.g., N-1-1], or to the subscriber’s MDN).
- The network shall reject a request for USCF diversion to an MS-provided number if an MS-provided number does not accompany that request.
- The network shall use a USCF subscriber identified number as the destination for USCF diversion if that number accompanies an authorized request for USCF diversion to an MS-provided number.
- USCF subscribers authorized for Variable Registration may register a network registered USCF DN via feature code (e.g., \*FC + # + termination address + **SEND**). A second or subsequent registration shall overwrite the previous network registered USCF DN.
- Requests for USCF diversion to an MS-provided number may need to be authenticated (e.g., by a unique challenge).
- If digits are sent to the network by an MS when the MS is instructed by the user to invoke a form of USCF, the only digits sent are a prestored digit string associated to the form of USCF being invoked; this includes a diversion number for USCF diversion to an MS-provided number. The contents of the MS’s buffers are not sent or modified.

- i. The USCF feature is applicable to all supporting 3G (or later) mobile stations and air interfaces. The applicability of USCF invocation to earlier or other non-compatible air-interfaces is not addressed.
- j. The mobile station shall not offer USCF as an option to the user unless the System to which the MS is registered supports USCF. Additionally, the mobile station shall not offer USCF as an option when alerting an idle subscriber unless the air interface currently in use supports the signaling needed for USCF invocation for incoming calls to idle subscribers.
- k. A serving network notifies served MSs that it supports USCF so that MSs can determine when USCF may be offered as an option to the subscriber.

## EDITORIAL KEY

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- 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 . .
- d. *ANSI-41-D, ANSI-124-B or ANSI-664-A* new enhanced text is identified via text with "double under-score" lines and right hand margin "diffmarks" when another standard modifies the same section, as:  
 . . existing text new enhanced text other standard's text existing text. . .

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# REVISION HISTORY

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Revision	Date	Remarks
1.0	July, 2000	Initial publication.
2.0	Dec, 2000	Updated based upon TSG-N modification.
2.1	January, 2001	Cover sheets and approval date are updated.



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# 1. INTRODUCTION

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## 1.1 OBJECTIVE

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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 User Selective Call Forwarding (USCF) feature use in the Wireless Radiotelephone Service.

## 1.2 SCOPE

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This document specifies the wireless intersystem network operation enhancements required for supporting roaming subscribers with the User Selective Call Forwarding (USCF) feature.

## 1.3 ORGANIZATION

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

# 2. REFERENCES

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## 2.1 Normative References

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TIA/EIA:

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

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

---

This section provides the Stage-1 feature description for User Selective Call Forwarding (USCF) according to the structure of *TIA/EIA-664*.

#### 3.1 **Definitions**

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(*TIA/EIA-664-001-B*, page 4)

##### **Switch Control Code (SCC)**

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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)**

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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)**

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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.

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

Switch Control Values	Usage
0	Forward the incoming call to a network registered 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**

**User Selective Call Forwarding (USCF)**

---

See User Selective Call Forwarding.

**4.2 Call Model**

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(TIA/EIA-664-XXX-B, page 20)

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. **addressedscV:** The subscriber instructs the MS to send an SCV and associated termination address, to the network.
- W. **sWitch control:** The subscriber instructs the MS to send an SCV to the network.

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*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:

<b>Action</b>	<b>1</b> Idle	<b>2</b> Alerting	<b>3</b> 2-way	<b>4</b> Adding on	<b>5</b> Holding 2-way	<b>6</b> 3-way	<b>7</b> 2-way CW notification	<b>8</b> 2-way CW	<b>9</b> Conference adding on	<b>10</b> Conference 2-way	<b>11</b> Conference
<b>Address and send</b>	Basic	Basic CC	CT= 3WC	CT= 3WC	CT 3WC	3WC	CW	CW	CC	CC	CC
<b>Conferee disconnect</b>	N/A	CC	N/A	N/A	N/A	N/A	N/A	N/A	CC	CC	CC
<b>other party Disconnect</b>	N/A	Basic	Basic	N/A	N/A	3WC	CW	CW	N/A	CC	N/A
<b>End key</b>	Basic	Basic	Basic	CT= 3WC	CT 3WC	CT 3WC	CW	CW	CC	CC	CC
<b>Feature code and send</b>	Basic Feature CC	Basic CC	Basic CC CCW MWN Feature	CC CCW MWN Feature	CT 3WC	3WC	CW	CW	CC	CC	CC
<b>callinG DTMF digits</b>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>Held disconnect</b>	N/A	Basic	N/A	CC CT= 3WC	CT= 3WC	N/A	N/A	CW	N/A	N/A	N/A
<b>Incoming call</b>	Basic	Basic	Basic CW	CC CT= 3WC	CT= 3WC	3WC	CW	CW	CC	CC	CC
<b>other party aNswers</b>	N/A	N/A	Basic	N/A	CT= 3WC	3WC	N/A	N/A	N/A	CC	CC
<b>Period</b>	N/A	Basic	Basic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>Send and no digits</b>	Basic	Basic CC	Basic CC CT= 3WC	CT= 3WC	CT 3WC	3WC	CW	CW	CC	CC	CC
<b>Third disconnect</b>	N/A	N/A	N/A	N/A	CT= 3WC	3WC	CW	N/A	N/A	N/A	N/A
<b>featUre code, termination address and send</b>	Basic CC	Basic CC	CT= 3WC CC	CT= 3WC CC	CT 3WC	3WC	CW	CW	CC	CC	CC
<b>addressed scV</b>	N/A	USCF	N/A	N/A	N/A	N/A	USCF	N/A	N/A	N/A	N/A
<b>sWitch control</b>	N/A	USCF	N/A	N/A	N/A	N/A	USCF	N/A	N/A	N/A	N/A

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

# X.1 User Selective Call Forwarding (USCF)

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

User Selective Call Forwarding (USCF) provides a called subscriber the capability to selectively redirect unanswered, incoming calls to an alternate destination (e.g., to a voice mail system, to a network registered USCF DN, or to a DN stored in the Mobile Station (MS)). USCF is applicable both to calls being offered to a subscriber via alerting and to calls being offered to a subscriber via Call Waiting Notification.

USCF subscribers may base a decision to invoke USCF on any consideration they deem appropriate (e.g., the time of day, their location, the activities in which they are engaged, etc.). USCF called subscribers also authorized for calling party information presentation features (e.g., Calling Number Identification Presentation [CNIP], Calling Name Presentation [CNAP], etc.) may redirect incoming calls to different DNs based on the received calling party's identity.

USCF subscribers are capable of redirecting incoming calls to an alternate destination DN independent of their authorization status for other redirection features (e.g., Call Forwarding Busy (CFB), Call Forwarding Default (CFD), Call Forwarding No Answer (CFNA), etc.).

## Applicability to Telecommunications Services

USCF is applicable to switched, circuit mode telecommunications services.

### X.1.1 Normal Procedures With Successful Outcome

#### Authorization

USCF may be generally available or may be provided after pre-arrangement with the service provider. The authorization may have the following subscription options:

Table 1.1a USCF Subscription Options

Subscription Options	Values
Registration	Network Variable. Subscribers are authorized to register their network registered USCF DN.
	Network Fixed. Forward-to a network registered USCF DN determined upon authorization.
	MS Variable. Subscribers are authorized to register their MS stored DNs.
	Voice Mail. Forward to the voice mail address of the subscriber.

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**De-Authorization**

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USCF may be withdrawn at the subscriber’s request or for administrative reasons.

**Registration**

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If the subscriber is authorized for Network Variable, an initial network registered USCF DN is registered at authorization by the subscriber. A second or subsequent Network Variable registration shall overwrite the previous network registered USCF DN. If the Network Variable registration is accepted, the system shall indicate success with feature confirmation treatment. If the Network Variable registration fails, the system may indicate failure with feature denial treatment.

If the subscriber is authorized for Network Fixed, the network registered USCF DN shall be registered upon authorization.

Storage in the MS of MS stored USCF DNs is left to MS implementation.

The voice mail address shall be registered upon authorization for USCF to voice mail subscribers.

**De-Registration**

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USCF shall be de-registered upon de-activation by the home service provider.

**Activation**

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USCF shall be activated upon authorization.

**De-Activation**

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USCF shall be de-activated upon de-authorization.

**Invocation**

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USCF may be invoked when there is an unanswered incoming call while the USCF called subscriber is being alerted (i.e., idle MS receiving Alerting treatment).

USCF may be invoked when there is an unanswered incoming call while the called USCF subscriber is active in a call (i.e., MS receiving Call Waiting [CW] treatment).

**Normal Operation With Successful Outcome**

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The following tables describe call party actions and system reactions for USCF.

**Table 1.1b: USCF Invocation from the Alerting State**

	<b>State</b> Alerting	<b>Condition</b>	The called USCF mobile station is in the alerting state for an incoming call delivery.
<b>XID</b>	<b>Call Party Action</b>		<b>System Reaction</b>
2W 2	The called subscriber invokes voice mail USCF using an MS specific procedure (e.g., causing the MS to send the SCV of 17 to the network using an air interface specific mechanism).		The calling party is redirected to the called USCF subscriber's voice mail system. Go to the Idle state.
2W 3	The called subscriber invokes Network Fixed or Network Variable USCF using an MS specific procedure (e.g., causing the MS to send the SCV of 0 to the network using an air interface specific mechanism).		The calling party is redirected to the network registered USCF DN. Go to the Idle state.
2V 1	The called subscriber invokes MS Variable USCF using an MS specific procedure (e.g., causing the MS to send the SCV of 16 and associated termination address to the network using an air interface specific mechanism).		The calling party is redirected to the MS stored USCF DN. Go to the Idle state.

**Table 1.1c: USCF Invocation from 2-Way Call Waiting Notification State**

	<b>State</b> 2-way call waiting notification	<b>Condition</b>	The called USCF subscriber is in a two-way conversation with the other party and call waiting notification is applied.
<b>XID</b>	<b>Call Party Action</b>		<b>System Reaction</b>
7W 2	The called USCF subscriber invokes USCF voice mail (e.g., causing the MS to send the SCV of 17 to the network using an air interface specific mechanism).		The calling party is redirected to the called USCF subscriber's voice mail system. Go to the 2-way state.
7W 3	The called USCF subscriber invokes Network Fixed or Network Variable USCF (e.g., causing the MS to send the SCV of 0 to the network using an air interface specific mechanism).		The calling party is redirected to the network registered USCF DN. Go to the 2-way state.
7V 1	The called USCF subscriber invokes MS Variable USCF (e.g., causing the MS to send the SCV of 16 and associated termination address to the network using an air interface specific mechanism).		The calling party is redirected to the MS stored USCF DN. Go to the 2-way state.

## Call Detail Record

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The system should record call detail information for the following:

- a. Network based USCF registration activities and events.
- b. USCF invocation events.
- c. USCF Forward-to call leg usage (e.g., duration, number).

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

## X.1.2 Exception Procedures or Unsuccessful Outcome

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### Registration

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If the subscriber is not authorized for the request, or if the forward-to number is not acceptable, the system may apply feature denial treatment when registration is attempted.

The system should not accept forward-to numbers to the operator (0- or 0+), service codes (N11), police, fire or similar agencies, or a revertive call.

### De-Registration

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None identified.

### Activation

---

None identified.

### De-Activation

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None identified.

### Invocation

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If the USCF redirected call cannot be routed to the forwarded-to destination, then the call should be given the appropriate treatment, such as applying the Special Information Tone for intercept to the calling party.

If the USCF invocation is rejected based on lack of USCF authorization, the invoking user should be informed using service rejection indications. The mobile station ALERT state or the Call Waiting Notification state should remain until the mobile station user takes an alternate action (e.g., answer the call) or the call is otherwise disconnected.

Precautions should be taken to preclude undesirable looping of USCF forwarded numbers within the MSC or between the MSC and other switching centers. If such looping is detected, the call forwarding should be given the appropriate treatment, such as applying the Special Information Tone for intercept to the calling party.

### **Exceptions While Roaming**

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

### **Exceptions During Intersystem Handoff**

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

## **X.1.3 Alternate Procedures**

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None identified.

## **X.1.4 Interactions With Other Cellular Services**

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### **Advice Of Charge (AOC) (Future)<sup>1</sup>**

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None identified.

### **Answer Holding (AH) (Future)<sup>1</sup>**

---

None identified.

### **Call Delivery (CD)**

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None identified.

### **Call Forwarding—Busy (CFB)**

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None identified.

### **Call Forwarding—Default (CFD)**

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None identified.

### **Call Forwarding—No Answer (CFNA)**

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None identified.

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<sup>1</sup>This feature is not currently defined. This description retained to describe an intent of feature interaction.

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**Call Forwarding—Unconditional (CFU)**

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None identified.

**Call Transfer (CT)**

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None identified.

**Call Waiting (CW)**

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CW is invoked before USCF. That is, calls arriving to a 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. The called subscriber may then invoke USCF.

Calls arriving to a 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)**

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Once alerted (or upon being notified of a waiting call), the called USCF subscriber may invoke USCF immediately, whether or not CNAP has been delivered.

**Calling Name Restriction (CNAR)**

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If the called (redirecting) subscriber invokes USCF with either the CNAR mode Permanently Restricted or the CNAR Default is Presentation Restricted, the redirecting name shall indicate *presentation restricted* to prevent the called subscriber's name presentation to the forward-to party or to the forward-to station.

**Calling Number Identification Presentation (CNIP)**

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Once alerted (or upon being notified of a waiting call), the called USCF subscriber may invoke USCF immediately, whether or not CNIP has been delivered.

**Calling Number Identification Restriction (CNIR)**

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If the called (redirecting) subscriber invokes USCF with either the CNIR mode Permanently Restricted or the CNIR Default is Presentation Restricted, the redirecting number shall indicate *presentation restricted* to prevent the called subscriber's number presentation to the forward-to party or to the forward-to station.

**Conference Calling (CC)**

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None identified.

## **Do Not Disturb (DND)**

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

## **Emergency Services (Future)<sup>1</sup>**

---

None identified.

## **Flexible Alerting (FA)**

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

## **Message Waiting Notification (MWN)**

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None identified.

## **Mobile Access Hunting (MAH)**

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

## **Password Call Acceptance (PCA)**

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None identified.

## **Preferred Language (PL)**

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None identified.

## **Priority Access and Channel Assignment (PACA)**

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PACA affects USCF. A call to a subscriber waiting for a PACA channel is considered to be busy, USCF does not apply.

## **Remote Feature Control (RFC)**

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None identified.

## **Selective Call Acceptance (SCA)**

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None identified.

## **Subscriber PIN Access (SPINA)**

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None identified.

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**Subscriber PIN Intercept (SPINI)**

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None identified.

**Three-Way Calling (3WC)**

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None identified.

**User Selective Call Forwarding (USCF)**

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Not applicable.

**Voice Message Retrieval (VMR)**

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None identified.

**Voice Privacy (VP)**

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None identified.

**1 SYSTEM FUNCTIONALITY**

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(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**

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(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. . . .
- b. System support for User Selective Call Forwarding.