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**3RD GENERATION
PARTNERSHIP
PROJECT 2
"3GPP2"**

Pre-Paid Charging (Stage 1)

Revision: 0

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Revision History

Revision		Date
Rev. 0	Initial Publication	December 1999

Note:

This specification is extracted from TIA TR45.2 PN-4287, Ballot Version, November 1999.

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3 Definitions and Concepts

3.1 Definitions

(TIA/EIA-664, Page 4)

Chargeable Event

A chargeable event is any event initiated either by the subscriber or by the network that may result in a decrease of the subscriber's PPC account balance. A chargeable event may occur during a voice telecommunications service. A chargeable event has a beginning and an end, which are used to start and stop the corresponding PPC invocation.

PPC Pre-Paid Charging

See 5.A

Post Usage Billing (PUB)

PUB allows the subscriber with proper credit to pay for telecommunications services after usage.

5.A Pre-Paid Charging (PPC)

(New for TIA/EIA-664 Section 5)

PPC allows the subscriber to pay for voice telecommunication services prior to usage.

A PPC subscriber establishes an account with the service provider to access voice telecommunications services in home and roaming networks. Charges for voice telecommunication services are applied to the PPC account by decrementing the account in real time. The PPC subscriber may be notified about the account information at the beginning, during, or at the end of the voice telecommunications service. When the account balance is low the subscriber may be notified so that the subscriber may refill the account. When the account balance is below a pre-defined threshold, the subscriber's use of voice telecommunications services may be de-authorized.

PPC may be activated for all calls or on a single call basis. For "All-Calls" activation, charges for all voice telecommunications services invoked are applied to the PPC account. For "Single-Call" activation, only charges for voice telecommunications services invoked in association with the call origination are applied to the PPC account.

Applicability to Telecommunications Services

PPC is applicable to voice telecommunications services. In the future, PPC may apply to other telecommunications services.

In this document, the usual billing practice is referred to as post-usage billing (PUB).

5.A.1 Normal Procedures With Successful Outcome

Authorization

PPC is provided after pre-arrangement with the service provider.

The authorization may have the following subscription options:

Subscription Options	Values
Single-Call Activation	Demand. The subscriber is authorized to activate PPC for a single call origination.
	Permanent. PPC may not be activated for single call originations.
All-Calls Activation	Demand. The subscriber is authorized to control the activation and de-activation of PPC for all calls.
	Permanent. PPC is active for all calls while authorized.

Table B: PPC Subscription Options

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De-Authorization

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

Registration

PPC has no registration.

De-Registration

PPC has no de-registration.

Activation

If the subscriber is authorized for Permanent "All-Calls" Activation, PPC is activated upon authorization.

PPC may be activated by a Demand "All-Calls" Activation authorized subscriber by specifying a feature code, as in:

* FC + **SEND** .

If the activation is accepted, the system shall indicate success with feature confirmation treatment.

PPC may be activated by a Demand "Single-Call" Activation authorized subscriber by specifying a feature code and a termination address:

* FC + # + termination address + **SEND** , or

* FC + termination address + **SEND** .

If the activation is accepted, the system shall indicate success with feature confirmation treatment. In this case PPC applies only to charges for voice telecommunication services associated with the call origination attempt.

De-Activation

PPC shall be de-activated upon de-authorization.

PPC may be de-activated by a Demand "All-Calls" Activation authorized subscriber by specifying a feature code, as in:

* FC0 + **SEND** .

If the de-activation is accepted, the system shall indicate success with feature confirmation treatment.

For a "Single-Call" activation, PPC is automatically de-activated after the single call attempt is cleared.

Invocation

PPC is invoked when a chargeable event begins and PPC is active.

Chargeable events that begin when PPC is active and are still in progress when PPC is de-activated, are charged to the PPC account. Chargeable events that begin when PPC is inactive and are still in progress when PPC is activated, are charged to the PUB account.

Normal Operation With Successful Outcome

PPC subscribers may have a “normal” PUB account. For those subscribers, the PPC and PUB service profiles do not have to be identical. For a subscriber who has both PPC and PUB profiles, the “Single-Call” PPC profile has precedence over the “All-Calls” profile.

A PPC subscriber may request the notification of current PPC account information at any time from the Pre-Paid Charging system, while not in an active call.

Normal operation with account balance above threshold

PPC subscribers can use all subscribed voice telecommunication services in a normal manner when their account balance is above a threshold level. When PPC is invoked, the PPC account is decremented in real time. Voice telecommunication services may be charged to the PPC account at a flat rate, on invocation, or according to usage duration.

The PPC subscriber may be notified about the account information and charges associated with voice telecommunication services at the beginning, during and/or at the end of the voice telecommunication services.

If PPC is active, the PPC account balance is positive, and Call Delivery is provisioned, Call Delivery shall be supported.

Final routing information is required by the PPC system before accurate charging can be applied against the PPC account.

Normal operation when a threshold condition is reached during a voice call

If the PPC account balance reaches a pre-set threshold while one or more voice calls are in progress, one of the following procedures can be used:

- The calls continue without interruption.
- If the PPC subscriber is engaged in one of the calls, the subscriber is notified. If the subscriber is not engaged in one of the calls, the subscriber or the subscriber’s proxy (e.g., voice mail system, assistant, etc.) may be notified. The calls continue without interruption.
- If the PPC subscriber is engaged in one of the calls, the subscriber is notified during the call. If the subscriber is not engaged in one of the calls, the subscriber or the subscriber’s proxy may be notified. Every call that is not ended in a timely manner is dropped.

If the PPC subscriber does not disconnect at the end of a call, the subscriber may be connected to customer service or to an automatic system to enable the subscriber to refill the account.

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If the PPC account balance reaches a preset threshold, the invocation of another chargeable service may be denied.

Notification may be provided by tone, announcement, voice mail, SMS, etc. Notifications are played only to the PPC subscriber or to the subscriber's proxy (e.g. voice mail system), not to the other parties on the calls.

Normal operation with insufficient balance

If the PPC account balance is below a pre-set threshold, a notification shall be provided to the subscriber. If the subscriber originates a call, the network may route the call to customer service to help the subscriber to refill the account. Incoming calls may be given the subscriber inaccessible treatment.

Some call cases may be allowed to proceed normally such as:

- Calls to emergency services
- Calls to and from customer service

Chargeable Events

The chargeable events for "All-Call" activation subscribers:

1. Voice call termination to a PPC subscriber
 - beginning: alerting, or called party answers,
 - end: disconnect (network- or user-initiated), or connection failure (radio or network), or abandon, or reject, or no answer
2. Voice call origination by a PPC subscriber
 - beginning: voice channel seizure, or ring back, or called party answers,
 - end : busy, or disconnect (network- or user-initiated), or connection failure (radio or network), or abandon, or no answer
3. Wireless services invoked on behalf of the PPC subscriber during a voice call:
 - In cases where the invocation of services causes calls to be placed, these calls are chargeable events with the same beginning and end conditions as described above. Additionally, the activation or the invocation of services may be chargeable events.
4. Wireless Services invoked on behalf of the PPC subscriber outside a voice call
 - In cases where the invocation of wireless services causes calls to be placed, these calls are chargeable events subject to the same beginning and end conditions as described above. Additionally, the activation or the invocation of wireless services may themselves be chargeable events.
5. Other charges associated with the PPC account (e.g. monthly fees.)

The chargeable events for "Single-Call" activation subscribers:

1. Voice call origination
 - Same as "All-Calls chargeable events"

2. Services invoked on behalf of the PPC subscriber associated with the voice call origination
 - In cases where the invocation of wireless services causes calls to be placed, these calls are chargeable events subject to the same beginning and end conditions as those described above. Additionally, the activation or the invocation of wireless services may themselves be chargeable events.
3. Other charges: same as “All-Calls” chargeable events

Call Detail Record

The system should record call detail information for the following:

- a. PPC activation
- b. PPC de-activation
- c. PPC invocation

See *TIA/EIA-124* for the specific information to be included for each element.

5.A.2 Exception Procedures or Unsuccessful Outcome

Registration

None identified.

De-Registration

None identified.

Activation

Permanent Activation

If the subscriber is not authorized for a request, the system shall apply feature denial treatment.

Demand Activation

If the subscriber is not authorized for the request, the system shall apply feature denial treatment when activation is attempted.

If PPC cannot be activated, an indication shall be provided to the subscriber that PPC is not available. If the subscriber is authorized for PUB, then PUB shall remain active and a notice to this effect may also be presented to the subscriber.

De-Activation

If the subscriber is not authorized for a request, the system shall apply feature denial treatment.

If PPC cannot be de-activated, a notification (e.g., SMS or tone) that PPC is still active shall be presented to the subscriber.

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For “Single-Call” activation, if PPC cannot be de-activated at the end of the call origination, PPC shall remain active and a notice to this effect may also be presented to the subscriber.

Demand De-Activation

If the subscriber is not authorized for the request, the system shall apply feature denial treatment when de-activation is attempted.

Invocation

If PPC cannot be invoked for a call origination, an appropriate error indication is provided to the subscriber and the call origination is denied.

If PPC cannot be invoked for a call to a PPC subscriber, subscriber inaccessible treatment may be provided to the calling party and an appropriate notification may be provided to the PPC subscriber.

If PPC cannot be invoked for services invoked on behalf of the PPC subscriber, the service shall be denied. An appropriate notification may be provided to the PPC subscriber.

Some calls, such as calls to and from customer service, may be allowed to proceed normally even if the PPC subscriber’s account balance does not allow normal call origination and termination.

Exceptions While Roaming

If a subscriber with PPC active roams into a system that does not support PPC, the following services may be available to the subscriber:

1. Calls to home customer service or to local customer service.
2. Receive SMS messages informing the subscriber that PPC is unavailable.
3. Receive announcements indicating PPC is unavailable.
4. Receive a notice to activate PUB if that service is authorized.
5. Activate PUB.
6. Calls to a single number specified by the home system (e.g., hot line).
7. Calls to locally allowed numbers (e.g., emergency service calls).
8. Credit card calls.

Exceptions During Intersystem Handoff

None identified.

5.A.3 Alternative Procedures

If the subscriber’s account balance is below the threshold, the subscriber may activate a PUB account to obtain call origination and call termination services.

5.A.4 Interactions With Other Wireless Services

Asynchronous Data Service (ADS)

None identified.

Call Delivery (CD)

PPC is invoked before CD.

Call Forwarding—Busy (CFB)

PPC is invoked before CFB.

Call Forwarding—Default (CFD)

PPC is invoked before CFD.

Call Forwarding—No Answer (CFNA)

PPC is invoked before CFNA.

Call Forwarding—Unconditional (CFU)

PPC is invoked before CFU.

Call Transfer (CT)

PPC is invoked before CT.

Call Waiting (CW)

PPC is invoked before CW.

Calling Name Presentation (CNAP)

PPC is invoked before CNAP.

Calling Name Restriction (CNAR)

None identified.

Calling Number Identification Presentation (CNIP)

PPC is invoked before CNIP.

Calling Number Identification Restriction (CNIR)

None identified.

Conference Calling (CC)

PPC is invoked before CC.

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Data Privacy (DP)

None identified.

Do Not Disturb (DND)

PPC is invoked before DND.

Emergency Services (9-1-1)

Emergency Services takes precedence over PPC.

Flexible Alerting (FA)

Interaction between PPC and FA is beyond the scope of this specification.

Freephone (FPH)

PPC is invoked before FPH.

Group 3 Facsimile (G3 Fax)

Not applicable.

Incoming Call Screening (ICS)

PPC is invoked before ICS.

Message Waiting Notification (MWN)

PPC is invoked before MWN.

Mobile Access Hunting (MAH)

Interaction between PPC and MAH is beyond the scope of this specification.

Network Directed System Selection (NDSS)

None identified.

Non-Public Mode Service (NP)

PPC interaction with NP is for further study.

Over-the-Air Service Provisioning (OTASP)

None identified.

Password Call Acceptance (PCA)

PPC is invoked before PCA.

Preferred Language (PL)	1
Announcement related to PPC should be presented to the PPC subscriber in subscriber's preferred language.	2
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Pre-Paid Charging (PPC)	7
Not applicable.	8
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Priority Access and Channel Assignment (PACA)	11
PPC is invoked before PACA.	12
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Remote Feature Control (RFC)	16
PPC is invoked before RFC.	17
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Selective Call Acceptance (SCA)	20
PPC is invoked before SCA.	21
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Short Message Services (SMS)	25
PPC is invoked before SMS.	26
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Subscriber Confidentiality (SC)	29
None identified.	30
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Subscriber PIN Access (SPINA)	33
PPC interaction with SPINA is for further study.	34
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Subscriber PIN Intercept (SPINI)	38
PPC interaction with SPINI is for further study.	39
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Three-Way Calling (3WC)	43
PPC is invoked before 3WC.	44
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User Group ID (UGID)	47
PPC interaction with UGID is for further study.	48
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Voice Message Retrieval (VMR)	51
PPC is invoked before VMR.	52
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Voice Privacy (VP)	56
PPC is invoked before VP.	57
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