Charging and Billing

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Charging and Billing in IMS

- One of the primary motivations for the use of IMS over basic SIP is the ability to "make money"

- Normally this means being able to bill for the usage of a service

- What is required to do this?

  - Identify users and the services they can access

  - Record billable activities

  - Bill them

Triple A

- Authentication - who are you?
- Authorization - are you allowed?
- Accounting - how many times?
- We'll focus on the second two in our billing discussion

Charging and Billing Systems

- Billing - focused on collecting money from the customer

- Charging - the broader term describing the process. We will talk about "Charging Architectures"

- Authorization - confirm that the charge-based event is allowed to proceed

- Accounting - keeping track of the things to be billed for - e.g. bits, bytes, calls, minutes

Product Charging Models

1. **One Time Purchase**
    - download of a file, ringtone, game, etc.

2. **Counted Access**
    - credit system for purchases - e.g. 10 songs, 100 text messages

3. **Time Based**
    - time of usage, good for 10 days

4. **Monthly Subscription**
    - flat rate

Potentially need to support various combinations of the above in a single application.

3GPP Charging Specs

- #TS 32.200   Charging Principles

- #TS 32.225   Charging Data Description for the IMS

- #TS 32.240   Charging Architecture and Principles

- #TS 32.250   Charging Management - Circuit Switched (CS) Domain Charging

- #TS 32.251   Charging Management - Packet Switched (PS) Domain Charging

- #TS 32.252   WLAN Charging

- #TS 32.260   IP Multimedia Subsystem (IMS) Charging

- #TS 32.270   Charging Management - Multimedia Messaging Service (MMS) Charging

- #TS 32.271   Charging Management - Location Services (LCS) Charging

- #TS 32.272   Push-to-talk over Cellular (PoC) Charging

- #TS 32.273   Charging Management - Multimedia Broadcast and Multicast Service (MBMS) Charging

- #TS 32.274   Charging Management - Short Message Service (SMS) charging

- #TS 32.295   Charging Management - Charging Data Record (CDR) Transfer

- #TS 32.296   Charging Management - Online Charging System (OCS): Applications and Interfaces

- #TS 32.297   Charging Management - Charging Data Record (CDR) File Format and Transfer

- #TS 32.298   Charging Management - Charging Data Record (CDR) Parameter Description

- #TS 32.299   Charging Management - Diameter Charging Applications

- #TS 32.421   Subscriber and Equipment Trace - Trace Concepts and Requirements

IMS Charging (3GPP)

- **Offline Charging**
  - Record call data, add to billing records
  - Primarily a logging function
    - CDR - Charging Data Records
- **Online Charging**
  - also known as credit based charging
  - per-transaction and pre-paid services
  - must be able to deny service if no credit is available
  - Real-time constraints

Offline Charging Architecture
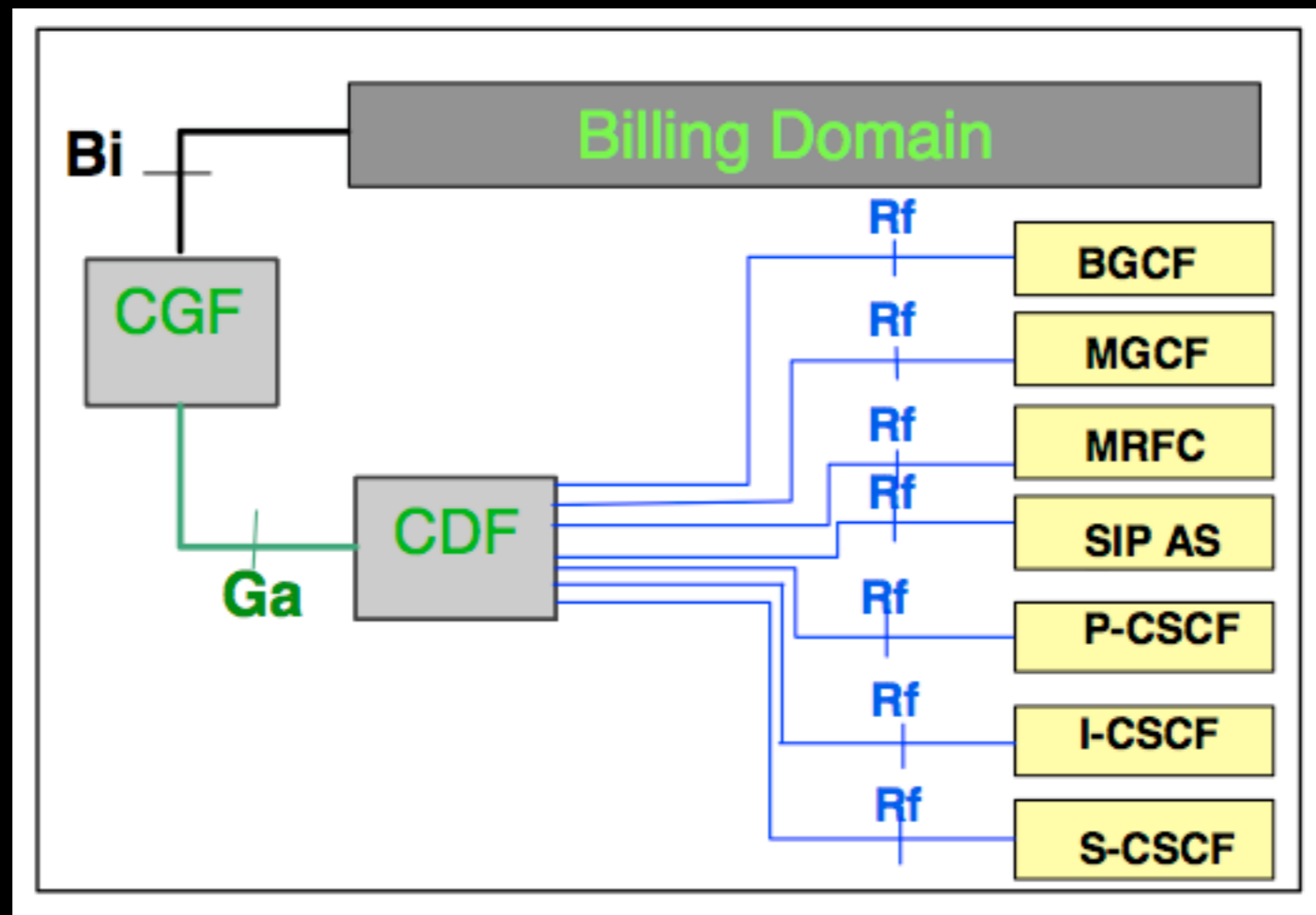
- CGF - Charging Gateway Function
- CDF - Charging Data Function
- CCF - Charge Collection Function - CGF+CDF
- Rf - Diameter - Charge Data Request/Response
- Bi - CDR - Charging Data Records

Online Charging Architecture
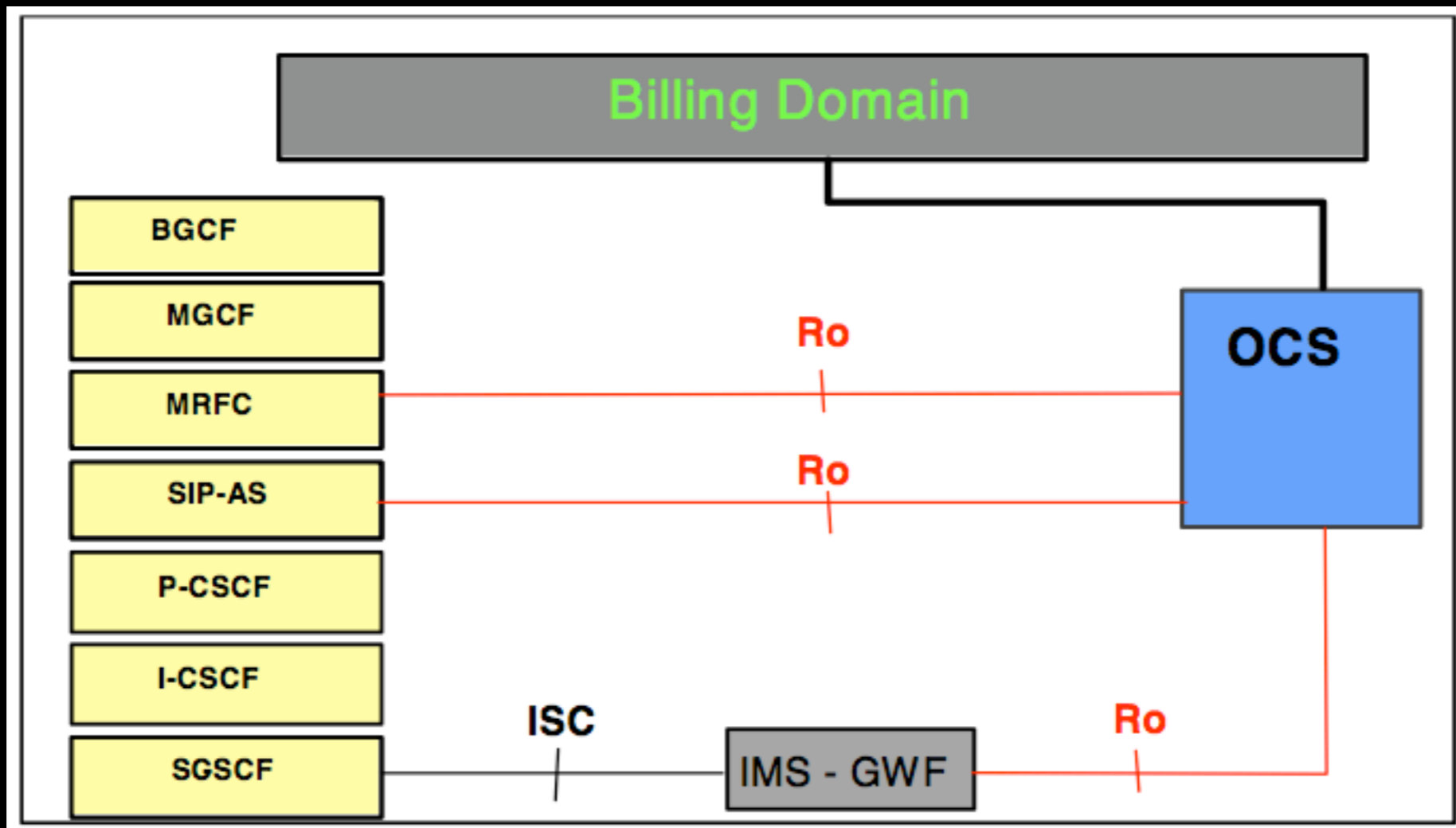
- OCS - Online Charging System
- Ro - Diameter - Debit and Reserve Units Request/Response
- MRFC - Media Resource Function Controller

SIP Headers

Two SIP headers for charging related functions, defined in RFC 3455, inserted by P-CSCF

P-Charging-Vector - globally unique id for charging related to this session

P-Charging-Vector: icid-value=1234bc9876e;
icid-generated-at=192.0.6.8; orig-ioi=home1.net; term-ioi=home2.net

icid - IMS charging identifier
ioi - Inter-Operator Identifier

P-Charging-Function-Address - which CCF is being used

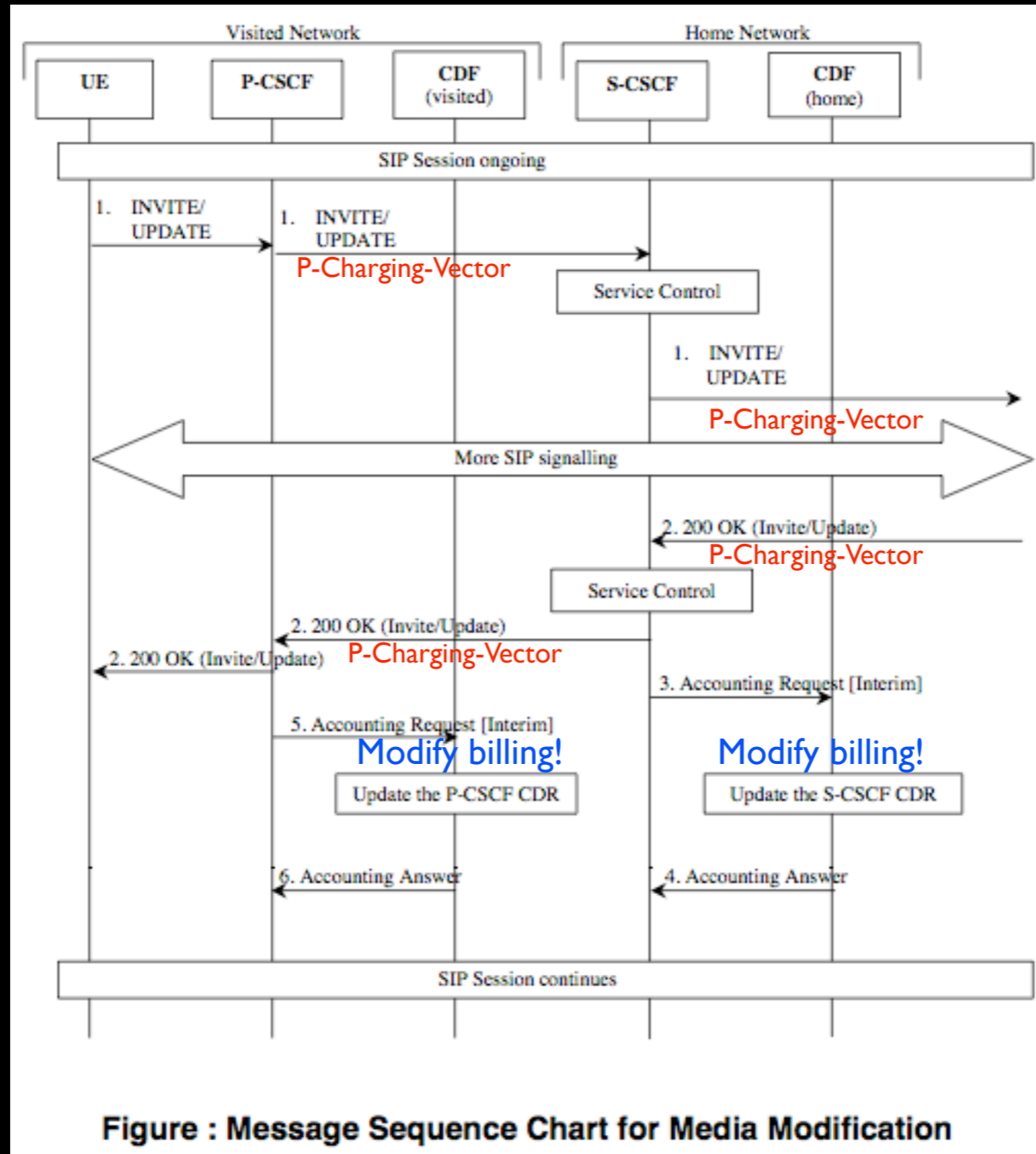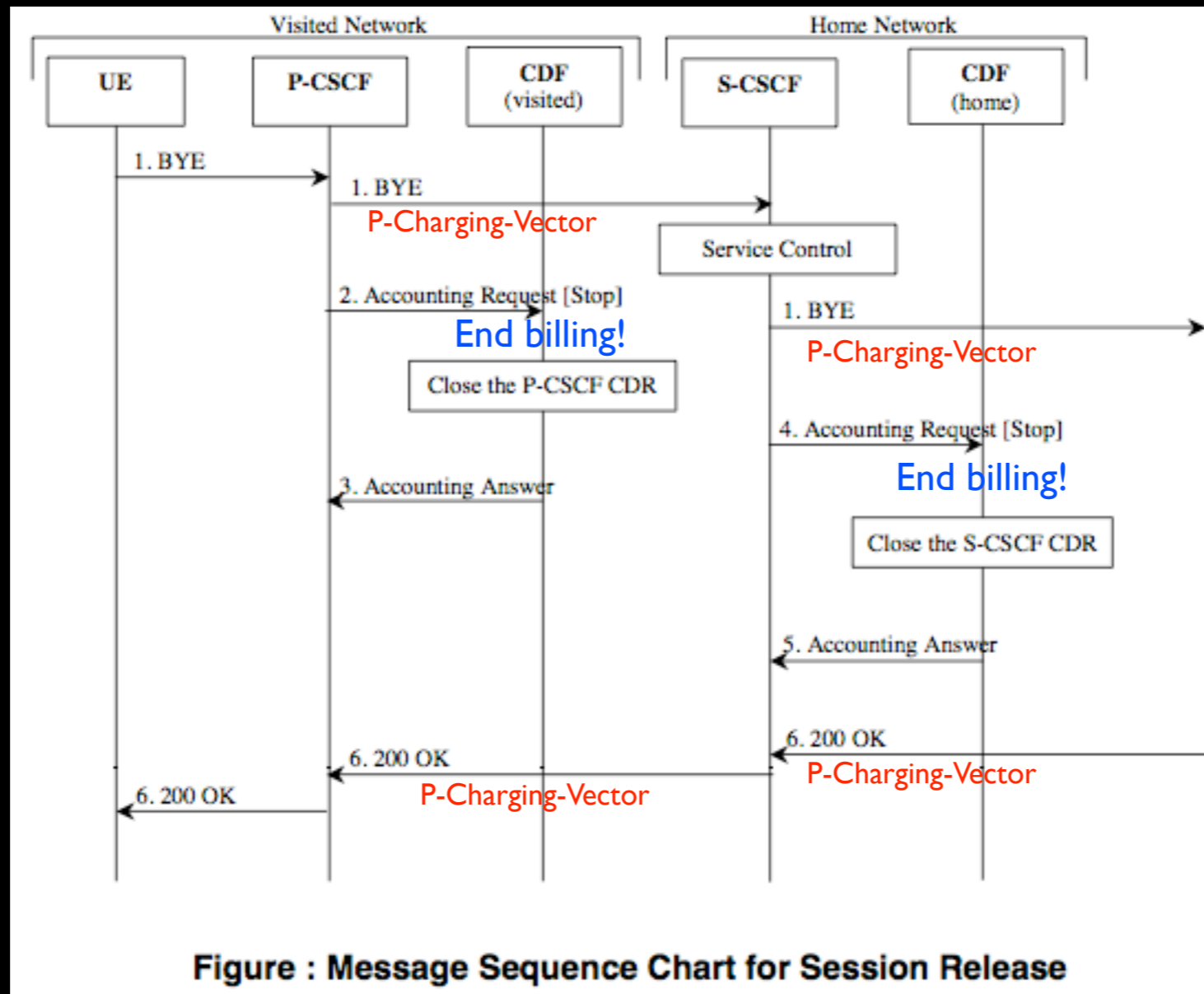*P-Charging-Function-Addresses: ccf=192.1.1.1; ccf=192.1.1.2*

Offline Example - Start
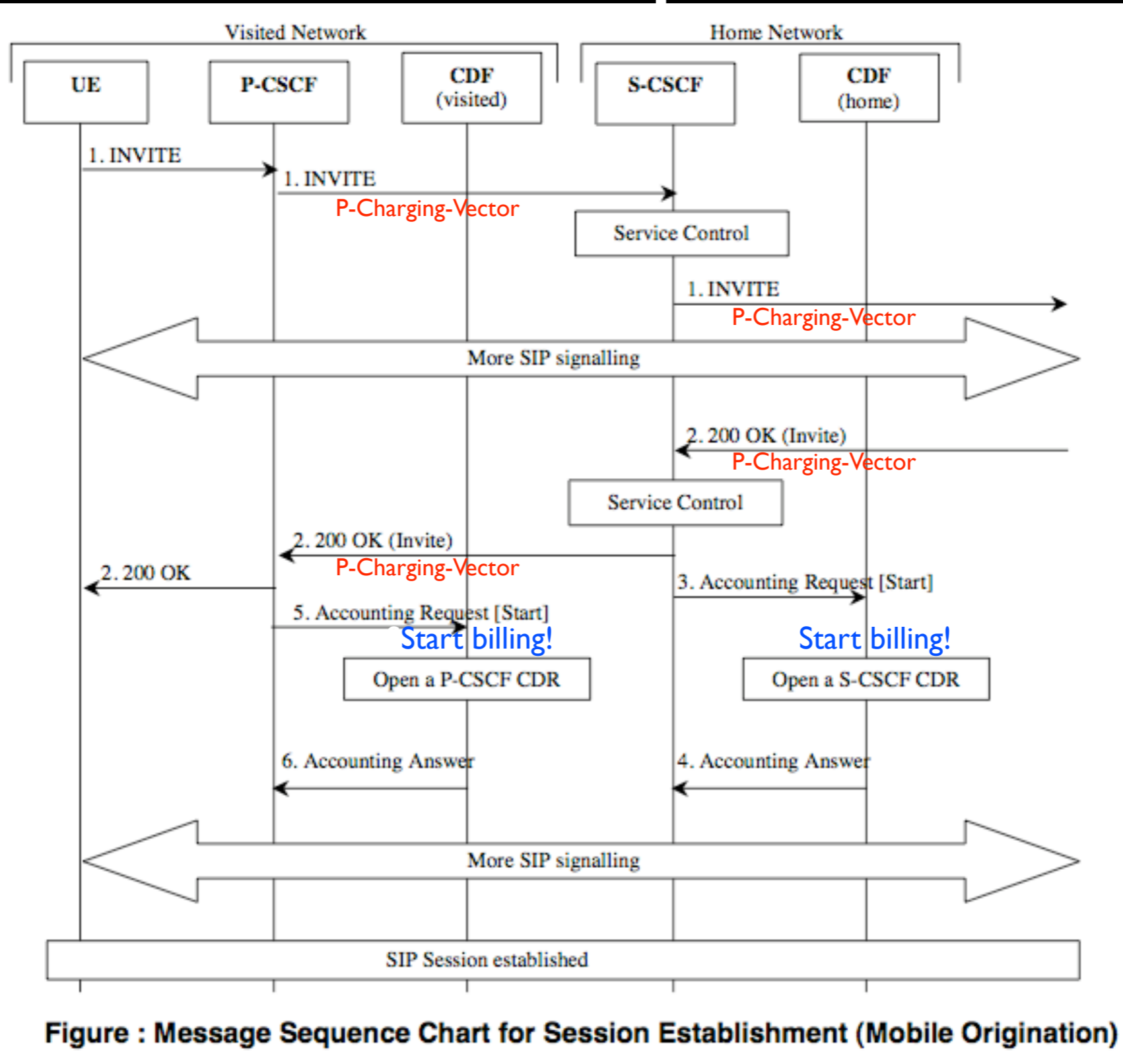
Figure : Message Sequence Chart for Session Establishment (Mobile Origination)

Offline Example - Modify

Figure : Message Sequence Chart for Media Modification

Offline Example - End Session

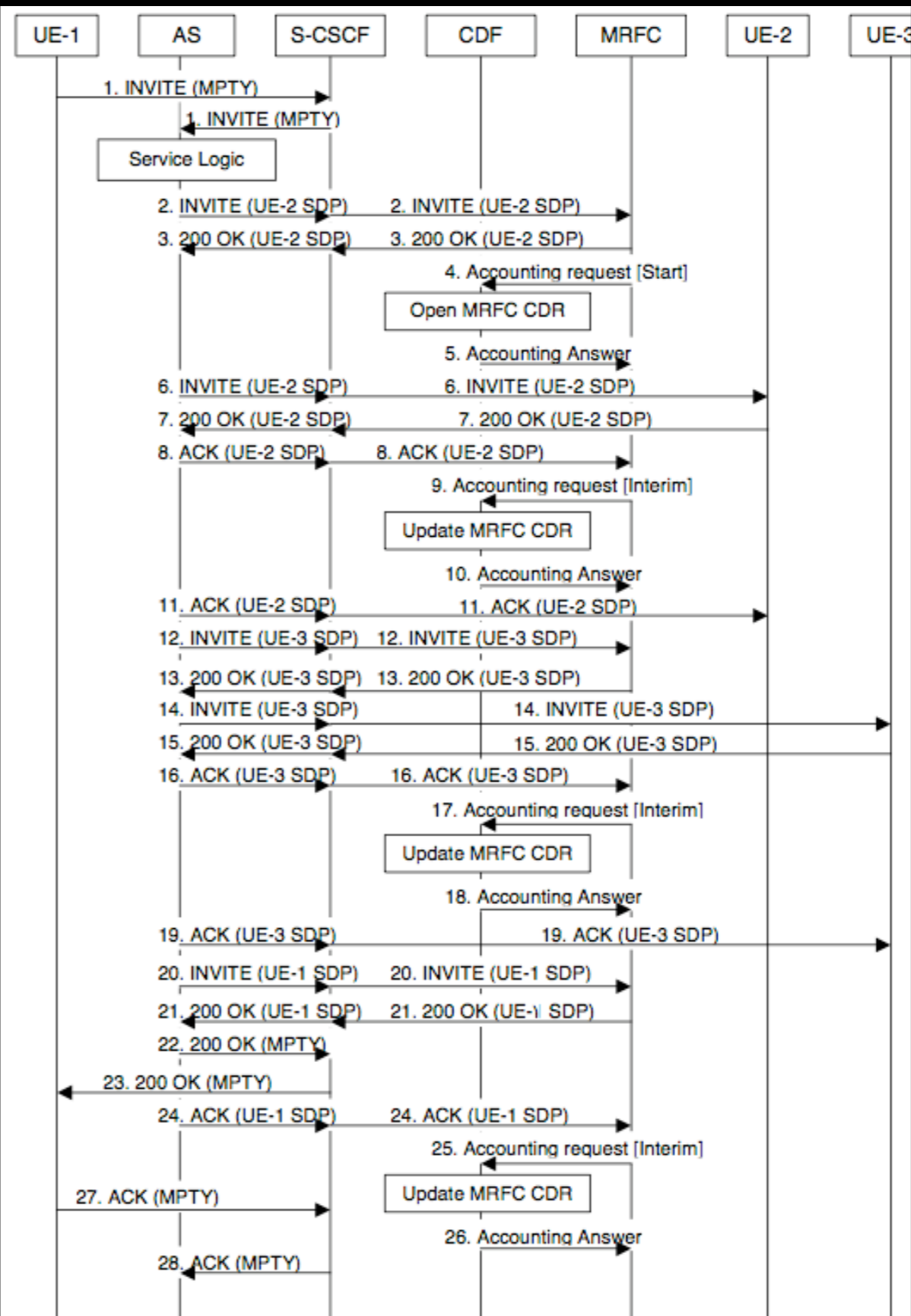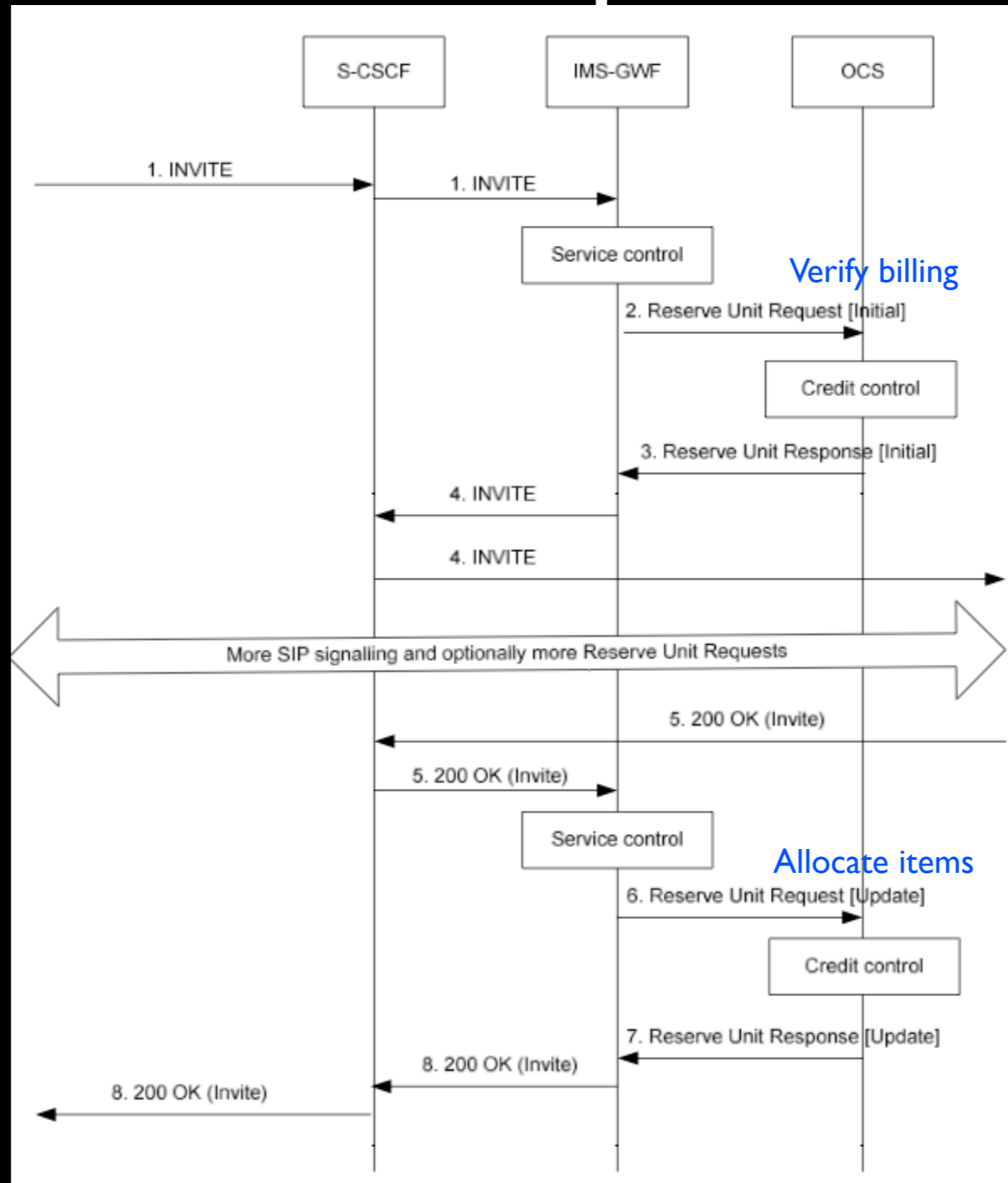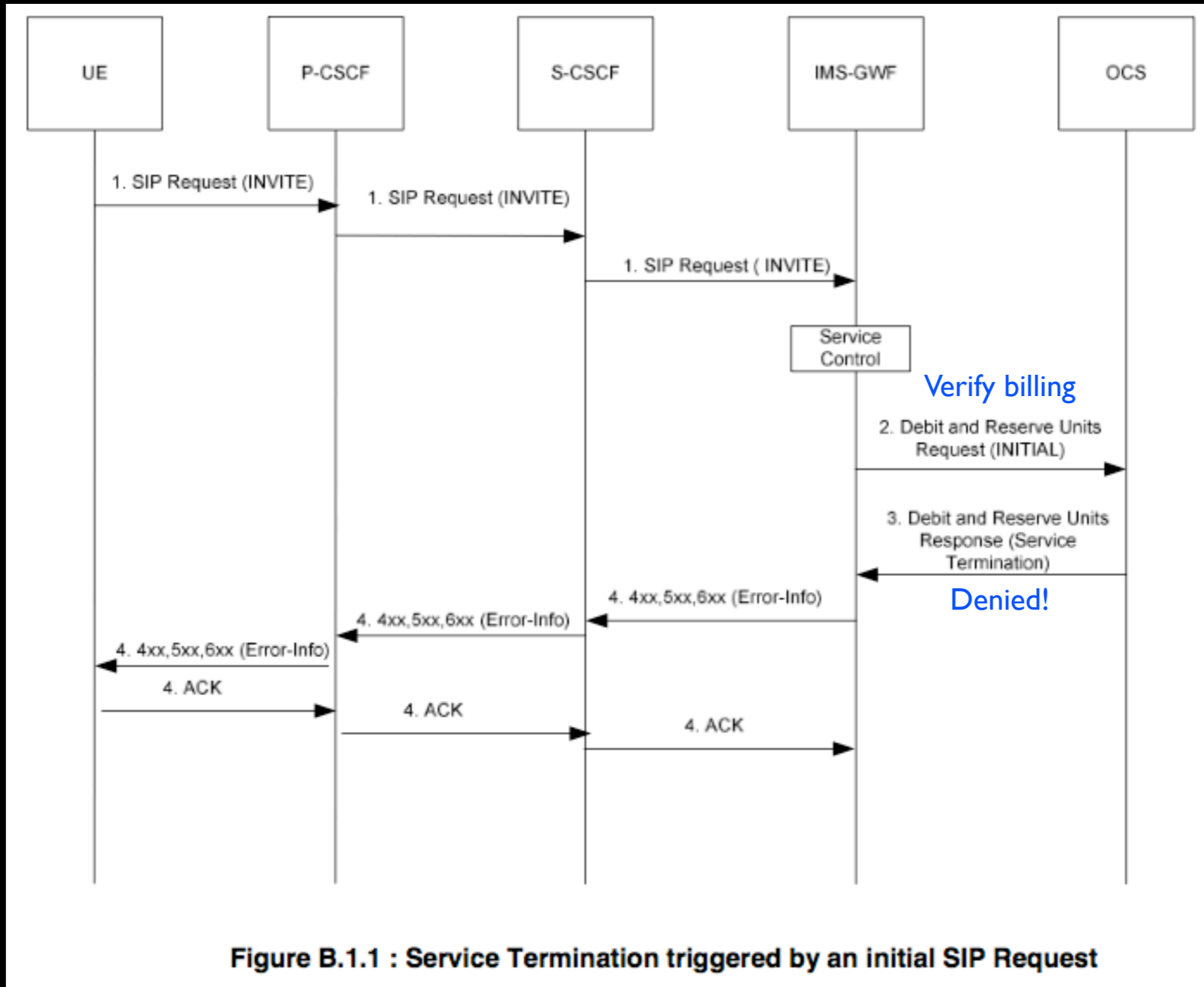Figure : Message Sequence Chart for Session Release

Offline Multiparty Call

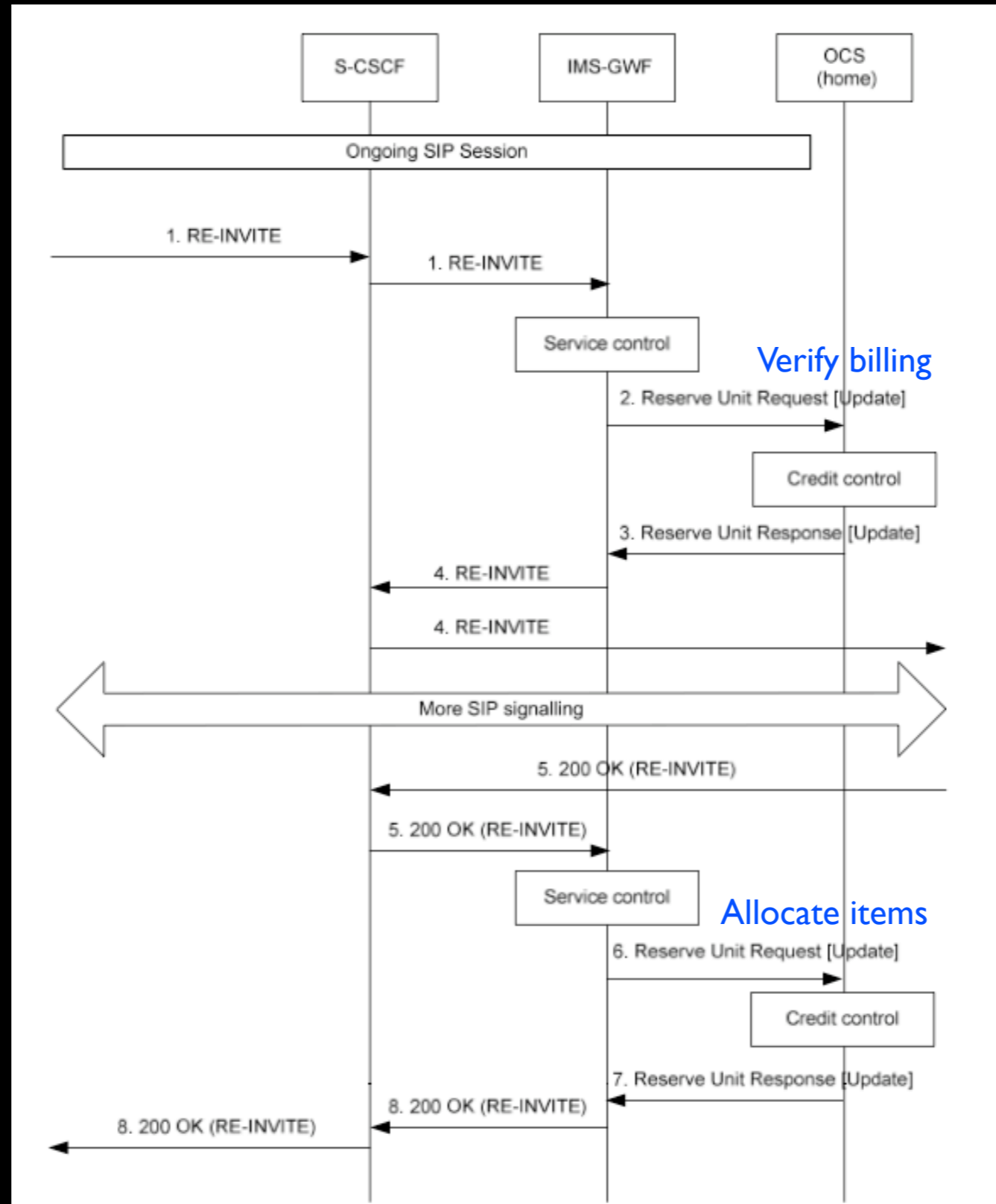Figure : Message Sequence Chart for Multi-Party Call Establishment in MRFC

Online Example - Start

Online Example - Denied

Figure B.1.1 : Service Termination triggered by an initial SIP Request

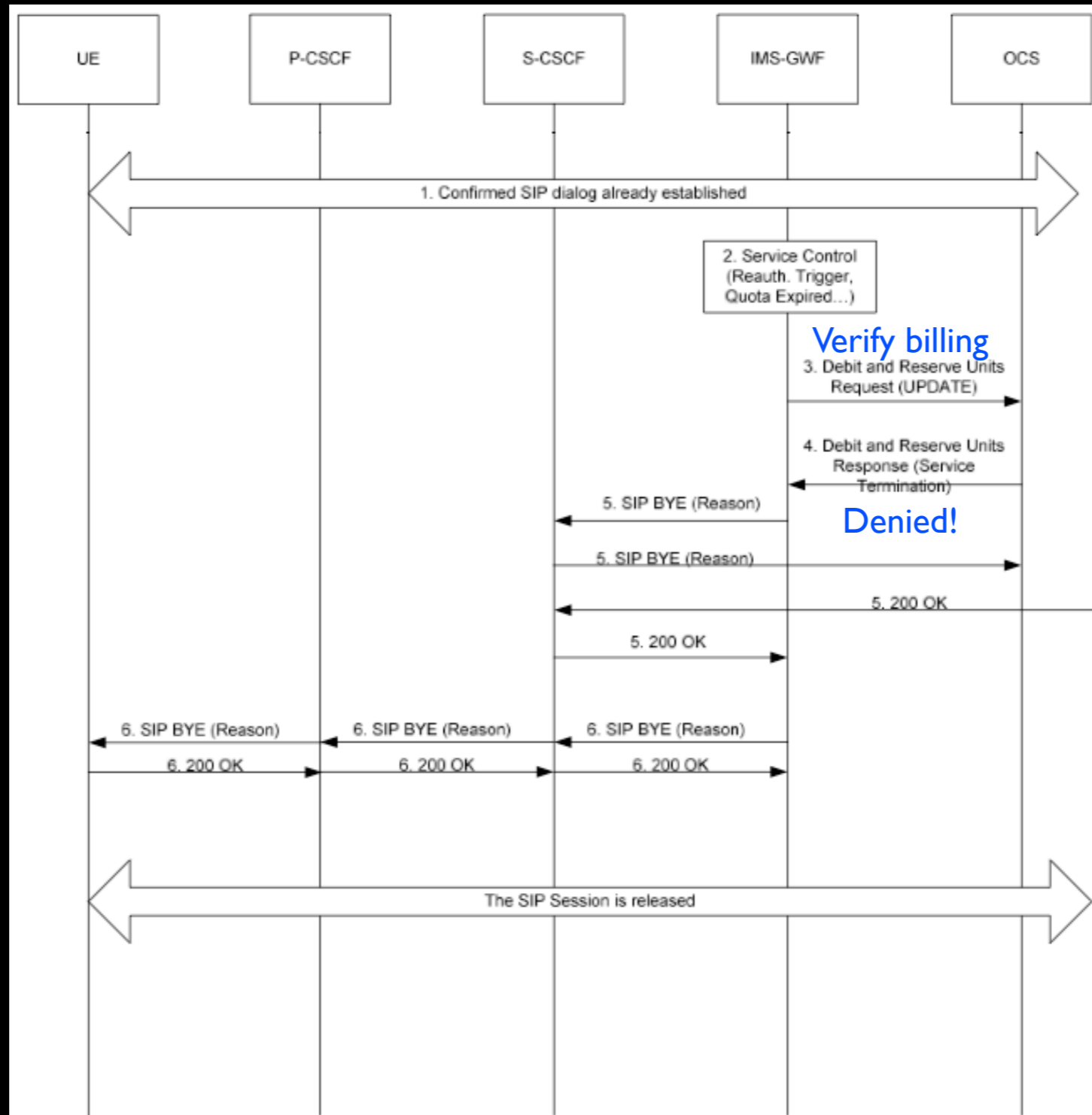# Online Example - Modify

Online Example - Termination

Figure B.3.3 : Service Termination triggered by the Charging Application procedures as defined in TS 32.299 [50] within a confirmed SIP dialog

Online Example - End