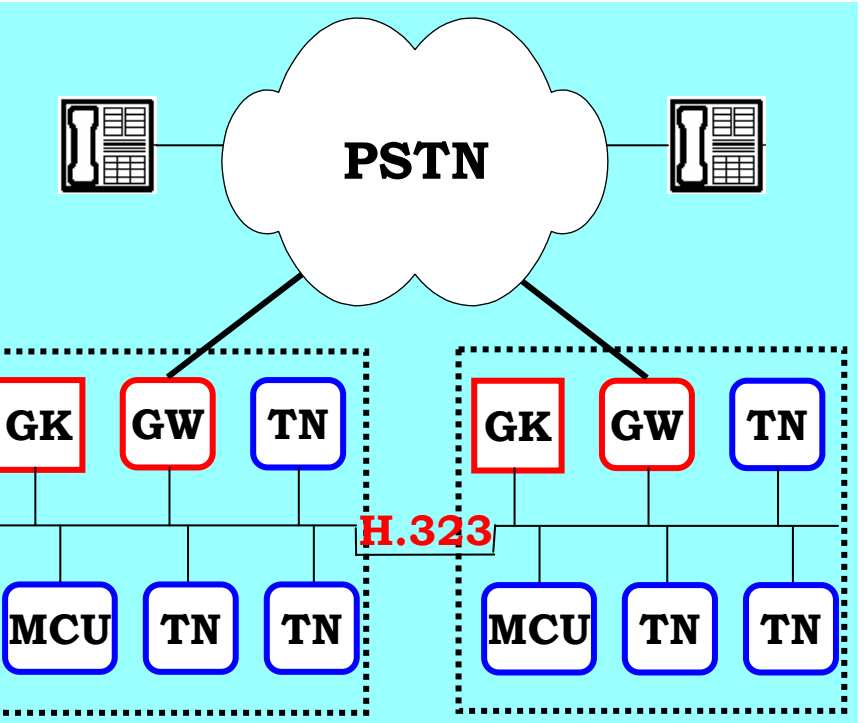
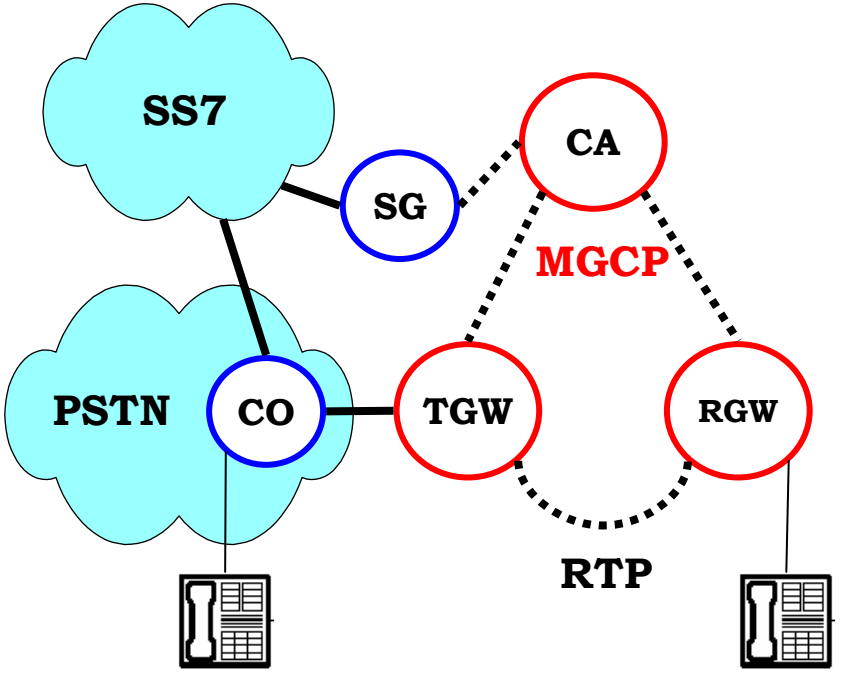
MEGACO/H.248

H323, SIP & MGCP, MEGACO



GW : Gateway
GK : Gatekeeper
TN : Terminal
MCU : Multipoint Control Unit



CA : Call Agent
TGW : Trunking Gateway
RGW : Residential Gateway
SG : Singling Gateway

H323, SIP & MGCP, MEGACO

- **H.323, SIP**
  - peer-to-peer
  - internet oriented
  - intelligent endpoint
    - optional GK
  - decentralized
- **Problems**
  - maintenance
    - cost & scalability of large systems
  - signaling & media control are coupled
  - interoperability with SS7

- **MGCP, MEGACO**
  - client-server
  - traditional telephony
  - intelligent server
    - "dumb" terminal
    - "stateless" terminal
  - centralized
- **Concept**
  - gateway decomposed
    - separate call control from media ports
    - CA, MG, SG
  - interoperability with PSTN

MEGACO Connection Model

	MGCP	MEGACO
1	Endpoint	Termination
2	Connection	Context
3	Call Agent (CA)	Media Gateway Controller (MGC)

MEGACO Termination

- **A logical entity on a MG**
  - that sources/sinks media/control streams
- **Termination ID**
  - an arbitrary string assigned by the MG
  - at the time of their creation
- **Two kinds of Termination**
  - Physical Interface
  - RTP stream
- **Root Termination**
  - The entire MG itself

MEGACO Context

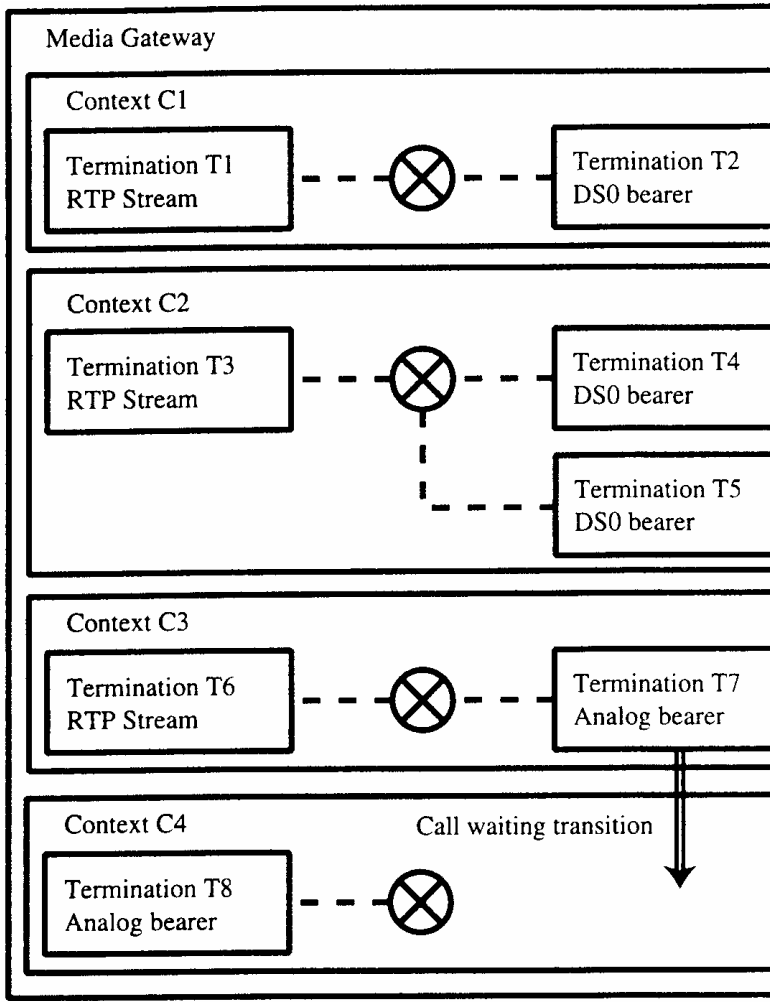
An association between a collection of Terminations (within an media gateway)

Context ID

- A 32 bit integer chosen by the MG
- * : ALL ; - : NULL; $: Choosing one

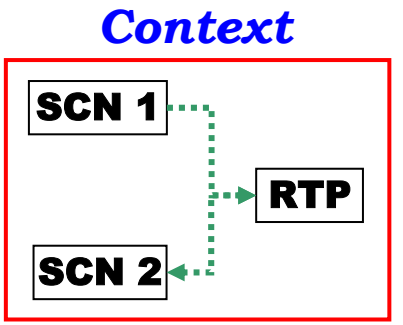
Null Context

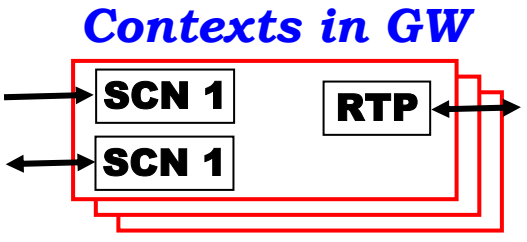
- Containing all Terminations that are not associated to any other Termination



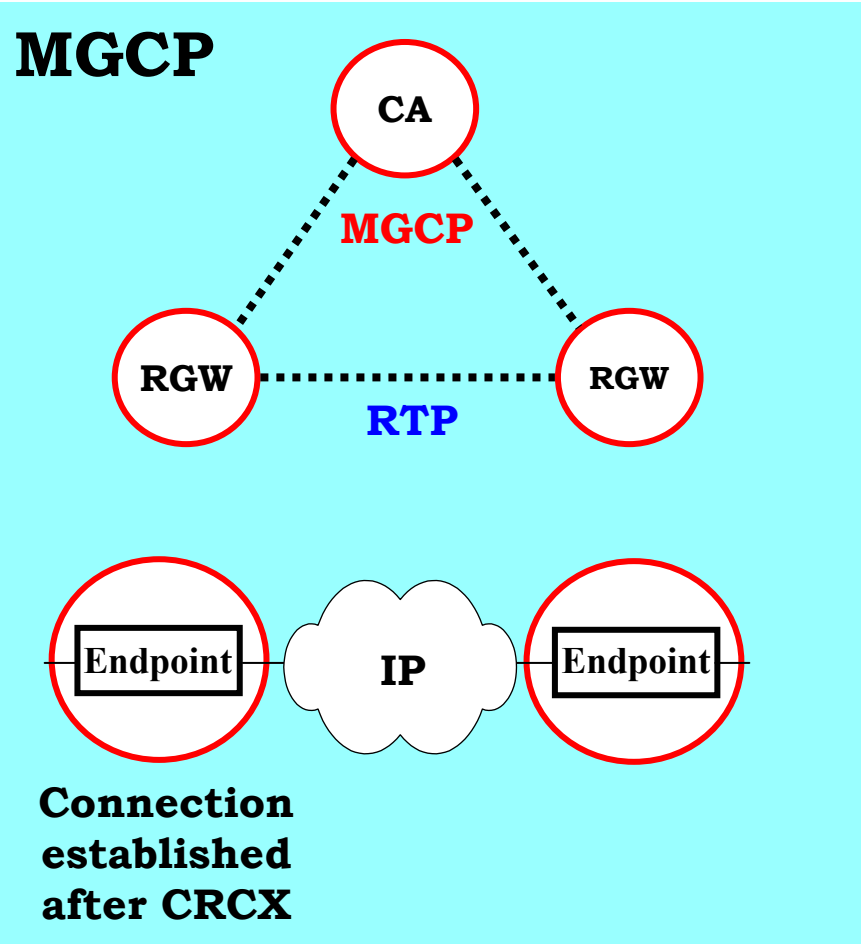
MEGACO Connection Model

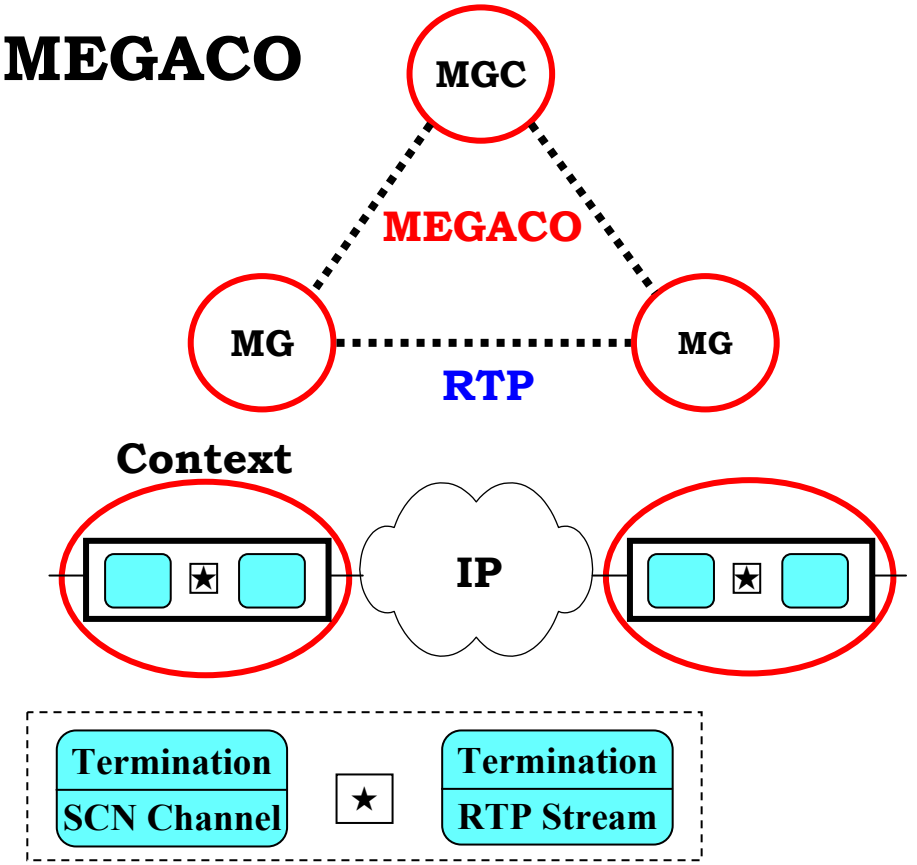
- **Media Flow**
  - Topology of a Context
    - describe the media flow between Terminations within a Context
    - refer to **Topology Descriptor**
  - Mode of a Termination
    - describe the media flow at the ingress/egress of the media gateway
    - refer to Media Descriptor
      Stream Descriptor
      Local Control Descriptor
      (receive-only, send/receive, …)





Concept of Context





Add 2 Terminations into 1 context

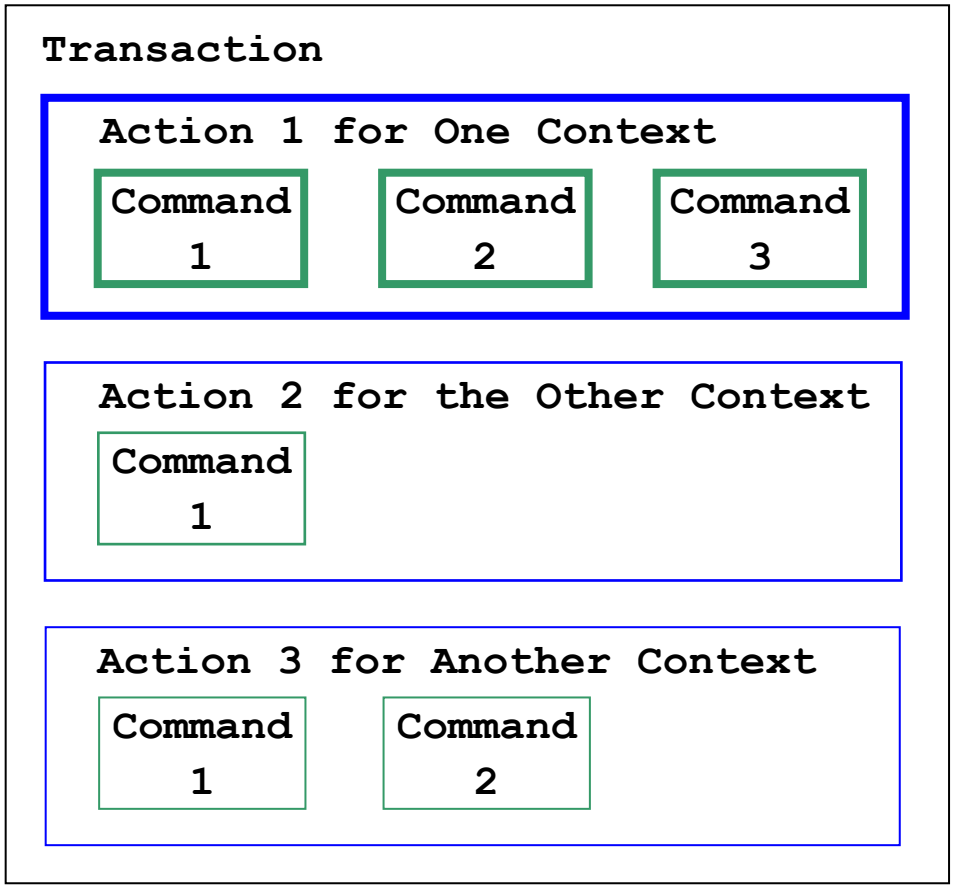
MEGACO Command Naming

MEGACO	Similar Commands in MGCP
(1) Add (Termination to Context)	(1) CreateConnection (Endpoint)
(2) Modify (Termination-descriptor)	(2) ModifyConnection (Endpoint)
(3) Subtract (Termination)	(3) DeleteConnection (Endpoint)
(4) Move (Termination)	≈ CreateConnection + DeleteConnection
(5) AuditValue (Termination-cur)	(4) AuditEndpoint
(6) AuditCapability (Termination)	(NONE)
(7) Notify (Termination)	(5) Notify (Endpoint)
(8) ServiceChange (Termination)	(6) RestartInProgress (Endpoint)
(NONE)	(7) AuditConnection
∋ Add, Modify, Move	(8) NotificationRequest (Endpoint)
∋ Add, Modify, Move	(9) EndpointConfiguration (Endpoint-encode)

Transaction & Message

- **Transaction**
  - Multiple commands can be grouped.
  - Commands are executed in sequence
    - If a command fails, the subsequent commands are not processed
    - Not the case for optional commands
      - O-"command-name"
- **Messages**
  - Concatenate multiple transactions
  - The transactions are treated independently

MEGACO Transactions

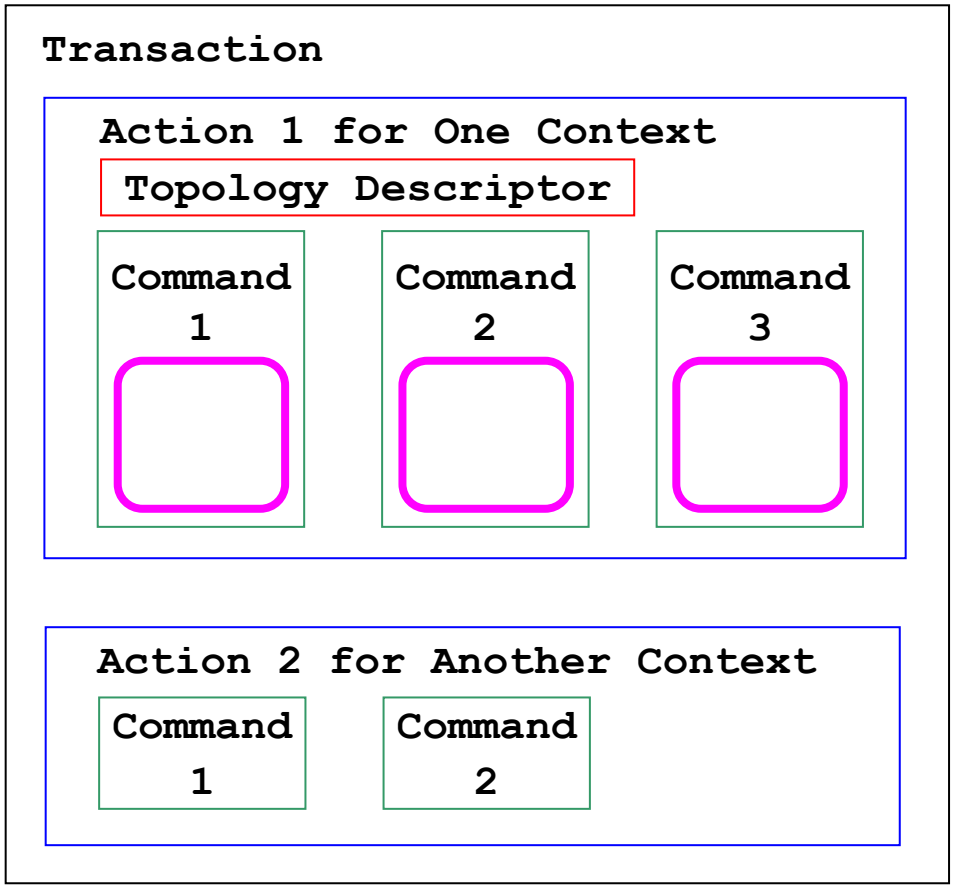



```
MGC to MG1:
MEGACO/1 [123.123.123.41]:5555
Transaction = 10003 {
  Context = $ {
    Add = A4444,
    Add = $ {
      Media {
        Stream = 1 {
          LocalControl {
            …}
          Local {
            v=0
            c=IN IP4 $
            m= audio $ RTP/AVP 4
            …}
        }}}}}
```

Descriptors

- To form the parameters of the commands/ responses
- To provide additional information to qualify given command/response
- Termination Descriptors
- Context Descriptors

Termination Descriptors



Media Descriptors

Modem Descriptors

MUX Descriptors

Events Descriptors

Signals Descriptors

Digit Map Descriptors

Audit Descriptors (no reply)

Service Change Descriptors

Observed Events Descriptors

Event Buffer Descriptors

Statistics Descriptors

Error Descriptors

Media Descriptor

- **Describe the various media streams**
- **A hierarchical descriptor**

Media descriptor
- **Termination state descriptor**
  - **Stream descriptor**
    - **Local control descriptor**
    - **Local descriptor**
    - **Remote descriptor**

Termination State Descriptor

- **ServiceStates**
  - To indicate whether the termination is available for use
    - ↙ **“test”, “out of service”, “in service”**
- **EventBufferControl**
  - To specify whether events detected by the termination are to be buffered following detection or processed immediately
- **Other properties of a termination that are not specific to any media stream**

Stream Descriptor

- **Stream ID**
- **LocalControlDescriptor**
  - **Mode: sendonly, receiveonly, sendreceive, inactive, and loopback**
    - **With respect to the exterior of the context**
  - **MGC specifies a set of choices for the session**
  - **ReserveGroup and ReserveValue indicate the resources should be reserved**
- **LocalDescriptor and Remote Descriptor**
  - `Usage of SDP`

Event & Signal Descriptors

- **Event Descriptor**
  - RequestIdentifier
  - A list of events that the MG should detect and report
- **Signal Descriptor**
  - On/off
  - Timeout
  - Brief

ServiceChange Descriptor

- Used only in association with the ServiceChange command
- ServiceChangeMethod (The type of service change)
  - Graceful, the removal of existing terminations w/o interrupting existing connections
  - Forced, an abrupt removal
  - Restart, after a specified delay
  - Disconnected, applied to the entire MG
  - Handoff, from the old MGC; a new MGC is taking over
  - Failover, from MG to MGC
- ServiceChangeDelay, a number of seconds
- ServiceChangeReason

DigitMap Descriptor

- A dialing plan
- A start timer, to start
- A short timer, when more digits are needed
- A long timer, to differentiate different routing

ObservedEvents Descriptor

- Mandatory in the Notify command
  - RequestIdentifier
  - Optional time-stamp for each observed event
- Except for the response of a ServiceChange command
- In a response to the AuditValue command
  - Events stored in the event buffer

Context Descriptors

Transaction

Action 1 for One Context

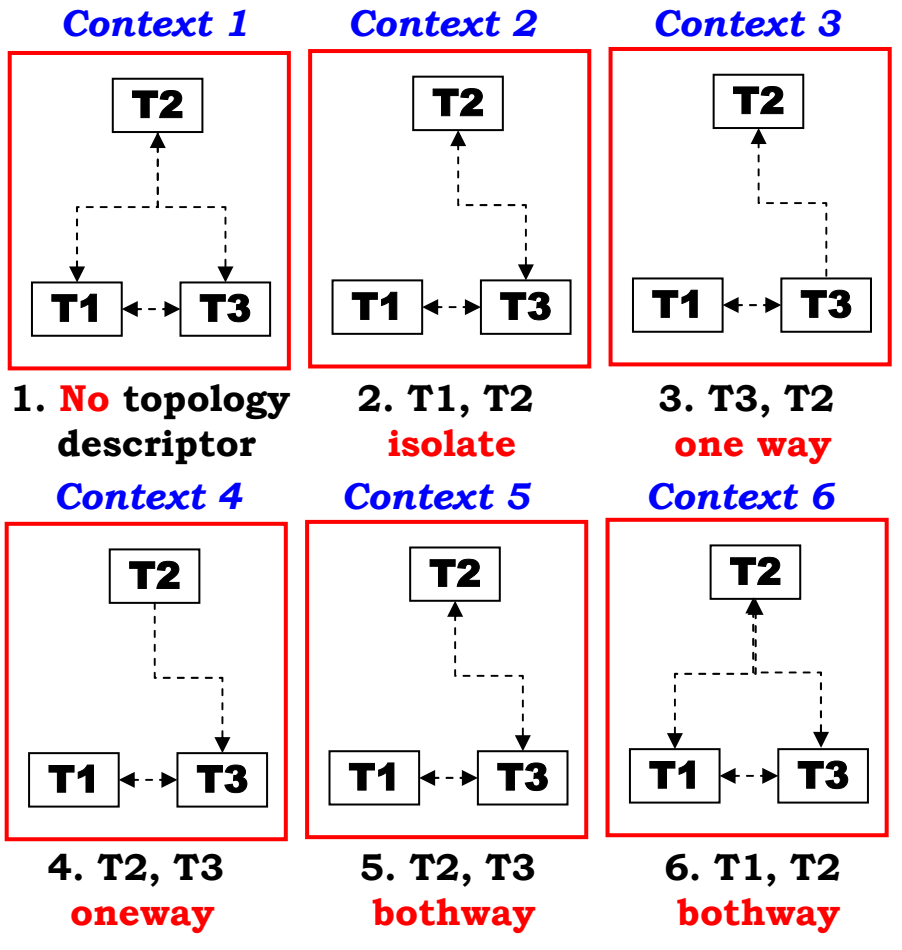
Topology Descriptor

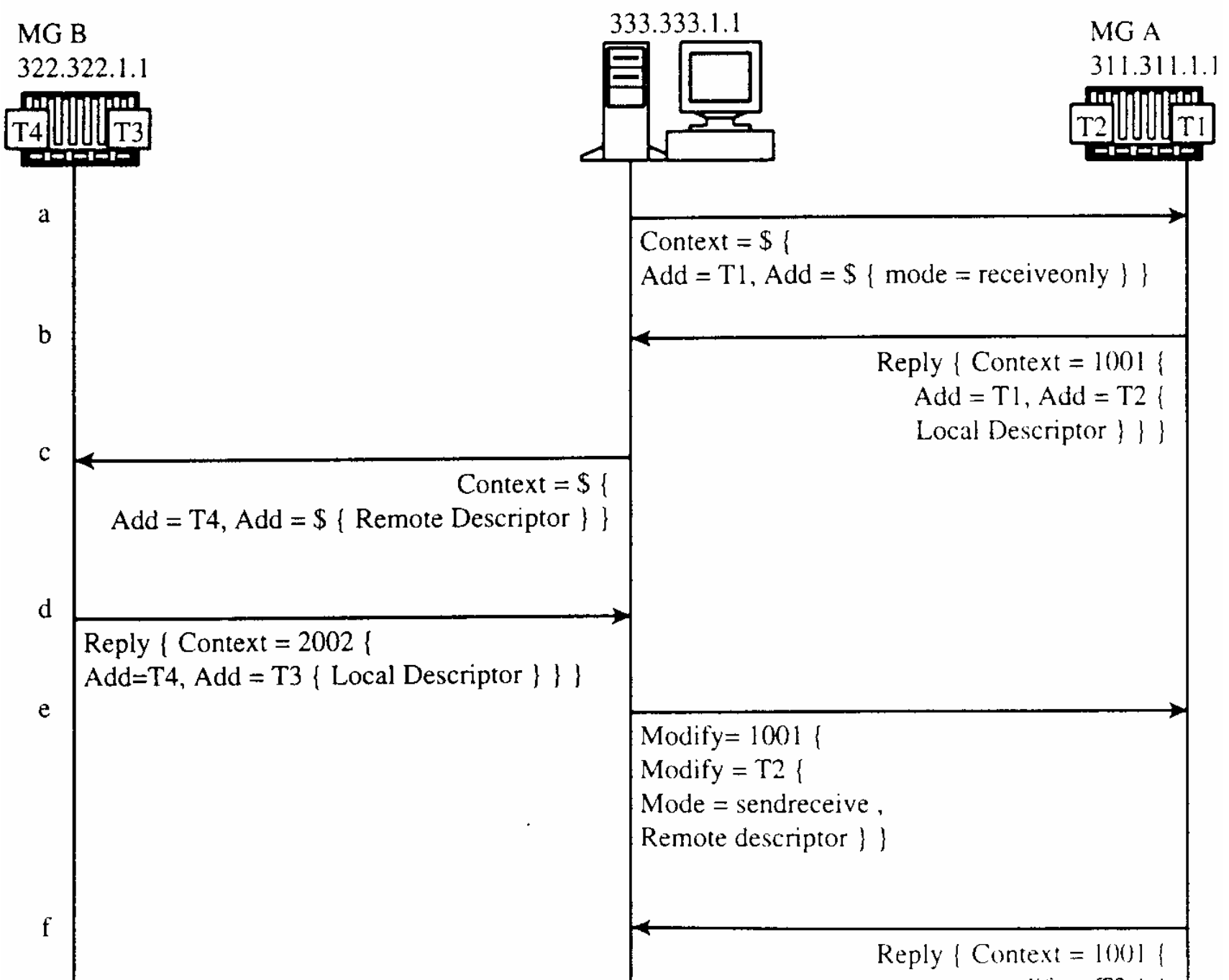
Command 1

Command 2

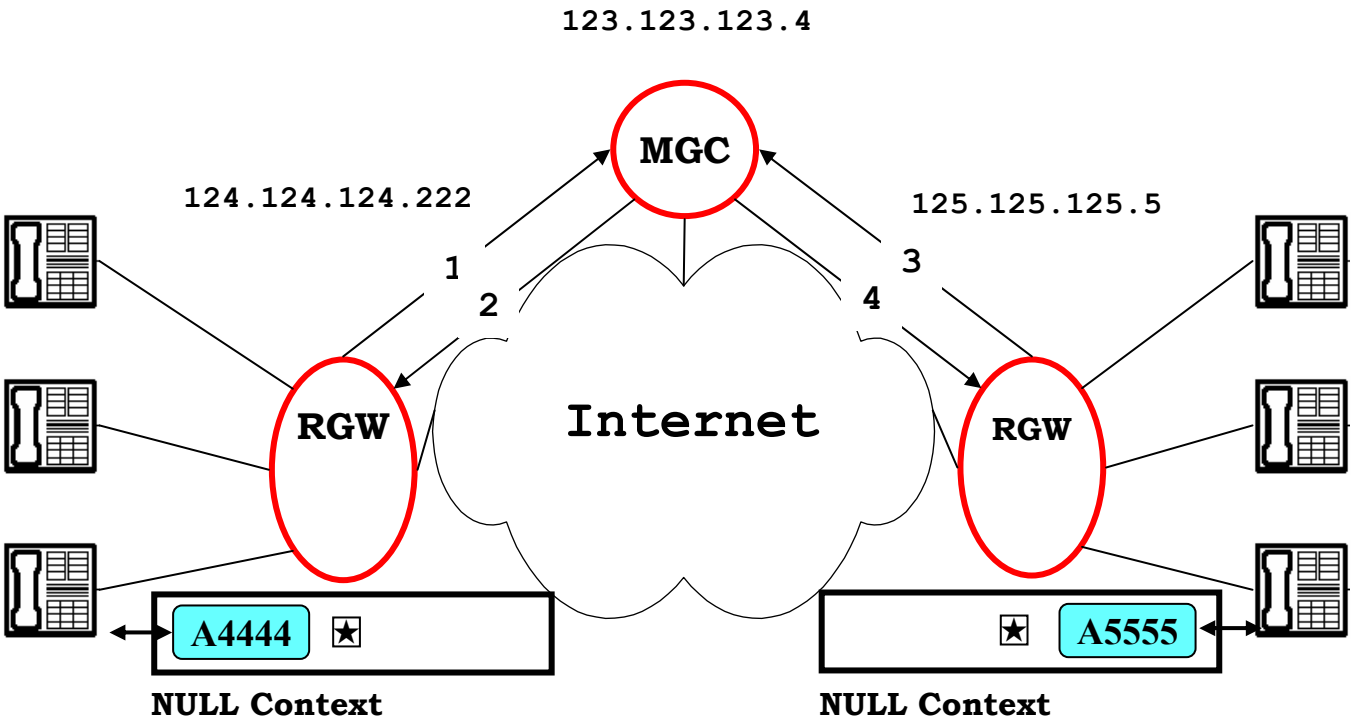
Action 3 for Another Context

Command 1




MG B
322.322.1.1
T4
T3
333.333.1.1
MG A
311.311.1.1
T2
T1
a
Context = $ {
Add = T1, Add = $ { mode = receiveonly } }
b
Reply { Context = 1001 {
Add = T1, Add = T2 {
Local Descriptor } } }
c
Context = $ {
Add = T4, Add = $ { Remote Descriptor } }
d
Reply { Context = 2002 {
Add=T4, Add = T3 { Local Descriptor } } }
e
Modify= 1001 {
Modify = T2 {
Mode = sendreceive ,
Remote descriptor } }
f
Reply { Context = 1001 {

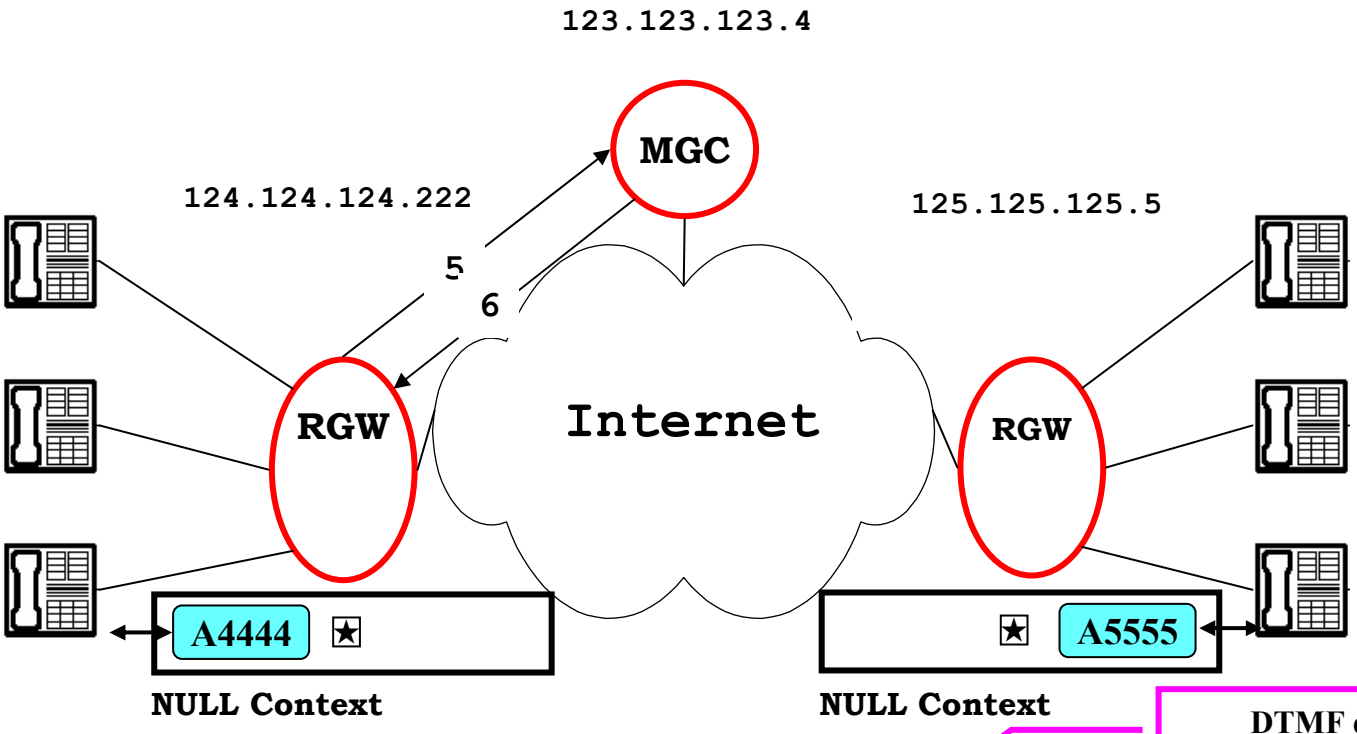
Call Flow: RGW to RGW



1.(3) ServiceChange(ROOT): MG register with MGC

2.(4) Modify(A4444): MGC set Mode(SendReceive) & Events(al/of)

Call Flow: RGW to RGW



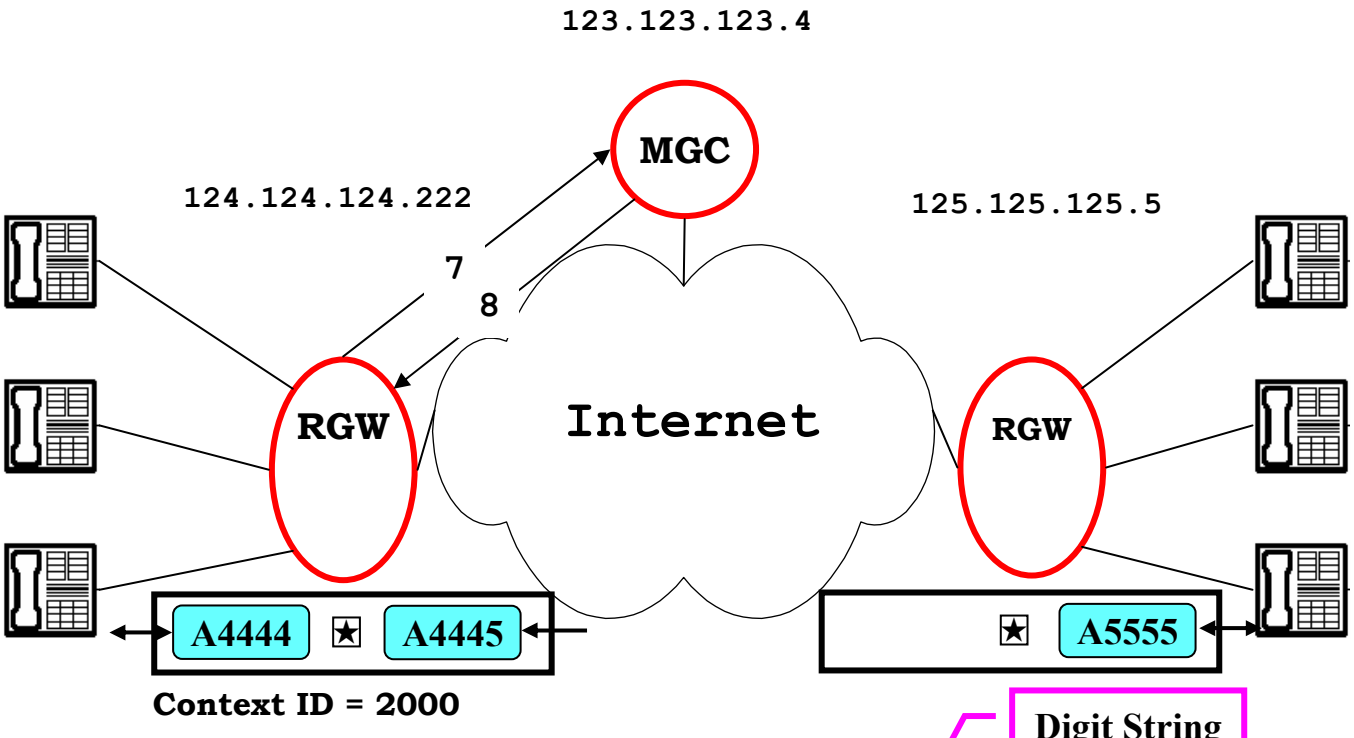
5. Notify(A4444): MG report an off hook event (time)

6. Modify(A4444): MGC set Events (al/on, dd/ce, {DigitMap = Dialplan0})
   Signals(cg/dt)

DTMF detection/
Digit Map Complete Event

Call Progress Tone Generator/Dial Tone

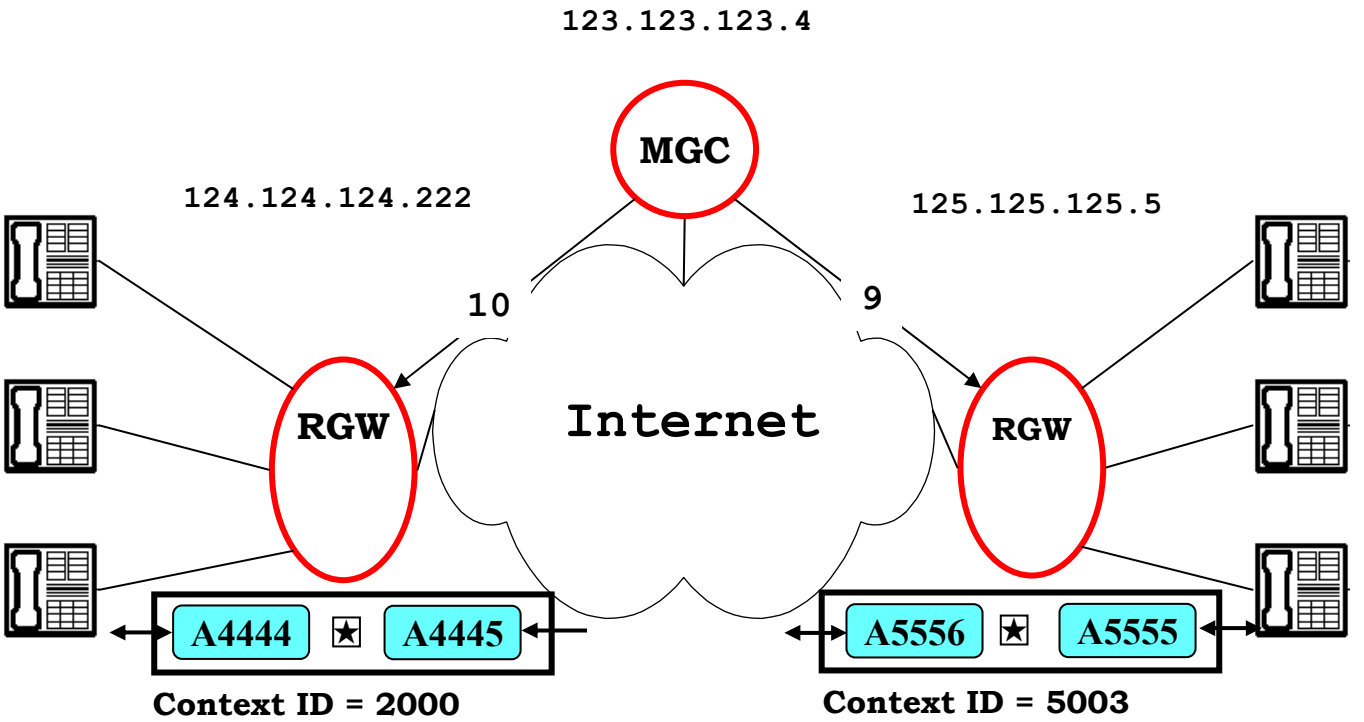
Call Flow: RGW to RGW



7. Notify(A4444): MG report a Digit Map Complete event(ds=916135551212,Meth=FM)

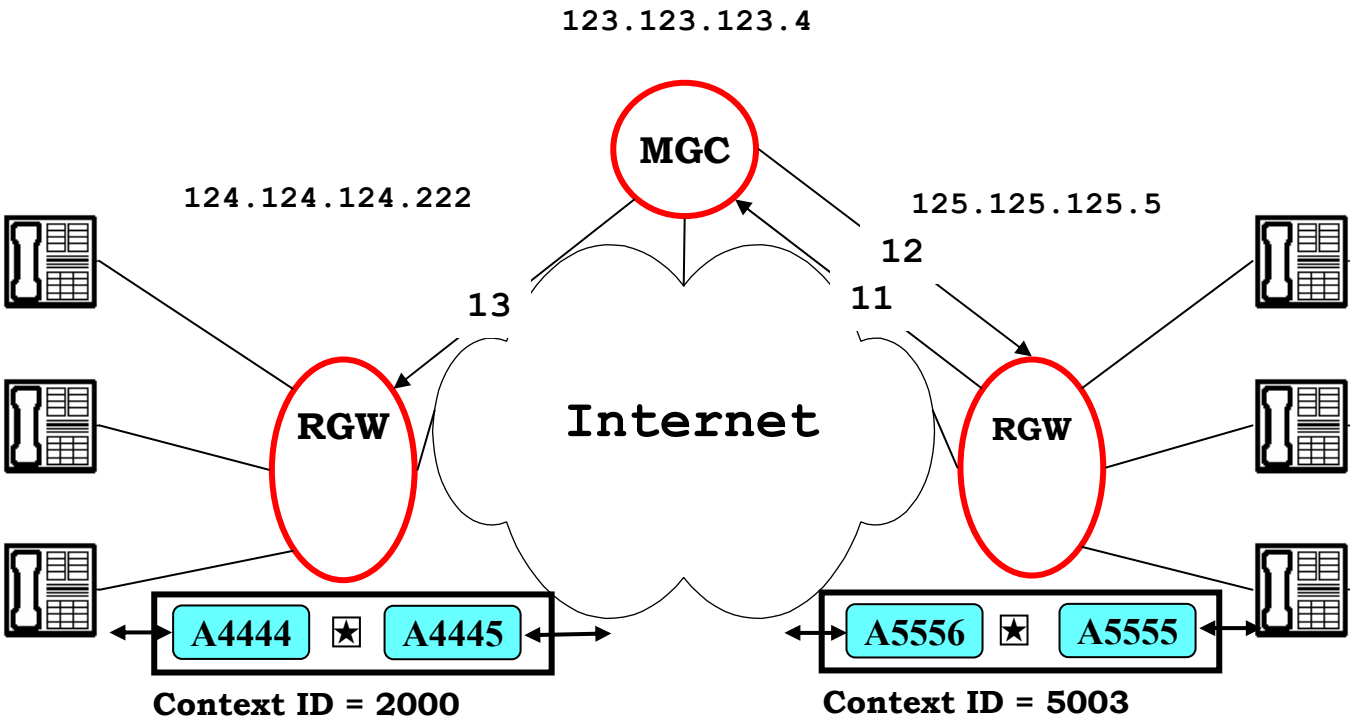
8. Add(A4444,$:Mode(ReceiveOnly), Local(RTP))

Call Flow: RGW to RGW



9. Add(A5555: Mode(SendReceive), Events(al/of), Signals(al/ri),
$: Mode(SendReceive), Local(RTP), Remote(...))
10. Modify(A4444: Signals(cg/rt), A4445: Remote(...)))

Call Flow: RGW to RGW



11. Notify(A5555: Observed(al/of))

12. Modify(A5555: Events(al/on), Signals()); to turn off ringing

13. Modify(A4445: Mode(SendReceive), A4444: Signals())