Media Gateway Control Protocol (MGCP and Megaco)
MGCP and Megaco

- gateways between IP telephony and PSTN: audio (media) and signaling

- large: digital (T-1, DS3), PBX ➝ lots of DSPs

- small: residential gateway (1–2 lines) ➝ cheap

- separate media gateway (MG) from media gateway controller (MGC)

- one MGC can control ➔ 1 MG

- successor to MGCP: H.248/Megaco
Architecture
Rationale

- service deployment: upgrade a few, not every household
- charging for services like call waiting or caller ID
- reliability: 911 … “general protection fault”
- simple end systems
- but: subscriber can only have one provider
Connections, endpoints, events, signals

**end points:** sources and sinks of data

**connections:** point-to-point, multipoint: ATM, IP, FR, PSTN, . . .

**events:** off-hook, on-hook, flash hook, dialed digits, . . .

**signal:** apply dialtone, ringing, busy, . . .

**packages:** groups of signals and events

dialing plan: [xxxxxxx|1xxxxxxxxxxx | 011x.T]
Describing connections

MGCP uses SDP to describe connections:

v=0
c=IN IP4 128.16.59.1
m=audio 3456 RTP/AVP 0 96
a=rtpmap:96 G726/4
MGCP commands

**NotificationRequest**: call agent requests gw to send events

**Notify**: gw sends event: e.g., off-hook

```plaintext
RQNT 1201 endpoint-1@rgw-2567.mci.net MGCP 1.0
N: ca@ca1.mci.net:5678
X: 31415
R: hd

NTFY 2001 endpoint-1@rgw-2567.mci.net MGCP 1.0
N: ca@ca1.mci.net:5678
X: 31415
O: hd
```
MGCP commands

CreateConnection: attach endpoint to IP address

ModifyConnection: change IP address, port, ...

DeleteConnection: returns statistics (packets sent, ...)

AuditEndpoint: get status of endpoint (events, dialing plans, ...)

AuditConnection: get status of connection (id’s, parameters)
Interoperation with PSTN

- Dial tone
- Dial digits
- IP address, port
- Remote IP address, port
- IAM
- ACM
- ANM
- End-to-end conversation
- Make connection full-duplex
- Ringing from PSTN
- Provide dial tone
- Collect digits
- Create connection
- NTBF: off-hook
- Off-hook
Interworking with SIP: **INVITE**

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**End System A (caller)**

- **SIPC**: INVITE
  - **NA(A)**: network addrss + port of X
  - **CRCX**: GetIPPort
- **MGCICA**: 200
  - **NA(A)**: SetRemote
- **MGCIGA**: NA(B)
- **JMF**: NA(A)
- **SIPC**: 200
  - **MDCX**: 200
  - **NA(B)**: MDCX
- **ACK**: NA(A)

**End System B (callee)**

- **SIPC**: CRCX
  - **NA(A)**
- **MGCICA**: CRCX
  - **NA(A)**
- **MGCIGA**: 200
  - **NA(B)**: SetRemote
- **JMF**: NA(B)

**Note:**
- NA(x): network address + port of X
- SIP signal
- MGCP signal
- API function call
Interworking with SIP: re-INVITE

End System A (caller)

End System B (callee)

NA(x): network address + port of X

INVITE

NA(A)

200

NA(B)

ACK

SIP signal

MGCP signal

API function call

JMF Changed

MDCX

MDCX

SetRemote

NA(A)

NA(A)

NA(A)

NA(B)

200

NA(B)

NA(B)

NA(B)
Interworking with SIP: BYE

[Diagram of Interworking with SIP: BYE]

- **End System A**
  - SIPC
  - MGCICA
  - MGCIGA
  - JMF
  - **BYE**
    - Call_ID
  - **DLCX**
    - Call_ID
  - **Success**
    - Call_ID
  - **200**
    - Call_ID

- **End System B**
  - SIPC
  - MGCICA
  - MGCIGA
  - JMF
  - **DLCX**
    - Call_ID
  - **StopTrans**
    - Call_ID
  - **Success**
    - Call_ID
  - **200**
    - Call_ID

**Signals**:
- Blue: SIP signal
- Brown: MGCP signal
- Black: API function call
Megaco architecture
Megaco operations

**Add:** termination to context;

**Modify:** properties, events and signals of a termination;

**Subtract:** disconnects a termination from its context;

**Move:** atomically moves a termination to another context;

**AuditValue:** returns the current state of properties, events, signals and statistics of terminations;

**AuditCapabilities:** returns all the possible values for termination properties, events and signals;

**Notify:** MG informs the MGC of the occurrence of events;
ServiceChange: MG notifies the MGC that a termination or group of Terminations is about to be taken out of service or has just been returned to service.