



STATE KEY LABORATORY OF SWITCHING TECHNOLOGY AND TELECOMMUNICATION NETWORK

北京邮电大学  
BEIJING UNIVERSITY OF POSTS AND TELECOMMUNICATIONS

## MGCP协议分析

### - MGCP协议基本分析

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## 媒体网关控制协议的需求

RFC2805 - Media Gateway Control Protocol Architecture and Requirements

- Per-Call Requirements
  - Resource Reservation
  - Connection Requirements
  - Media Transformations
  - Signal/Event Processing and Scripting
  - QoS/CoS
  - Test Support
  - Accounting
  - Signalling Control
- Resource Control
  - Resource Status Management
  - Resource Assignment
- Operational/Management Requirements
  - Assurance of Control/Connectivity
  - Error Control
  - MIB Requirements
- General Protocol Requirements
  - MG-MGC Association Requirements
  - Performance Requirements
- Transport
  - Assumptions made for underlying network
  - Transport Requirements
- Security Requirements
  - Requirements specific to particular bearer types
    - Media-specific Bearer Types
    - Application-Specific Requirements

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## MGCP协议基本操作 - MGCP协议请求

- MG注册命令
  - **RSIP** RestartInProgress MG接入服务/退出服务
- 端点管理与查询
  - **EPCF** EndpointConfiguratin 对端点进行配置
  - **AUEP** AueditEndpoint 检测MG中特定端点的状态
  - **AUCX** AueditConnection 检测MG中特定连接的状态
- 事件监测设置与通知
  - **RQNT** NotificationRequest 请求MG处理信号,监测事件
  - **NTFY** Notify MG检测到了特定事件,并上报给MGC
- 连接管理
  - **CRCX** CreateConnection 在MG中创建特定的连接
  - **MDCX** ModifyConnection 修改MG中连接的属性
  - **DLCX** DeleteConnection 删除MG中建立的连接

MGCP所有的请求都针对“端点”

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## MGCP协议基本操作 - MGCP协议响应

- 1xx 临时的响应
  - 100 事务正在被执行
- 2xx 命令成功完成
  - 200 请求的事务成功完成
  - 250 连接成功删除
- 4xx 暂时性错误
  - 400 事务由于暂时性错误不能被执行
  - 403 端点当前没有足够的资源
  - 404 目前带宽不足
- 5xx 永久性错误
  - 500 事务由于端点未知而不能执行
  - 501 事务由于端点未准备好而不能执行
  - .....

MGCP是基于“请求-响应”的协议

MGCP是基于“Transaction”的协议

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## MGCP的消息结构

generic-message = Command Line  
  \*Parameter Line  
  [Session Description]

Command Line =RequestMethod TransactionID EndpointName ProtocolVers  
Parameter Line =ParameterName : [WS]ParameterValue

<b>NotificationRequest (RQNT)</b> [RequestedEvents] R [RequestIdentifier] X [DigitMap] D [SignalRequests] S [DetectEvents] T [NotifiedEntity] N	<b>Notify (NTFY)</b> [NotifyIdentifier] X [ObservedEvents] O [NotifiedEntity] N	<b>ModifyConnection (MDCX)</b> CallID C ConnectionID I [NotifiedEntity] N [LocalConnectionOptions] L [ConnectionMode] M [RemoteConnectionDiscrptor] RC
<b>RestartInProgress (RSIP)</b> RestartMethod RM [RestartDelay] RD [ReasonCode] E	<b>CreateConnection (CRCX)</b> CallID C [NotifiedEntity] N [LocalConnectionOptions] L ConnectionMode M [[RemoteConnectionDiscrptor] RC SecondEndpointId] Z	<b>DeleteConnection (DLCX)</b> CallID C ConnectionID I

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## MGCP协议扩展包

Generic Media Package			
Package Name: G			
Symbol	Definition	R	S
rt	Ringback Tone		TO
DTMF Package			
Package Name: D			
Symbol	Definition	R	S
1	DTMF 1	✓	BR
#	DTMF #	✓	BR
*	DTMF *	✓	BR
T	Interdigit Timer	✓	TO
Line Package			
Package Name: L			
Symbol	Definition	R	S
bz	Busy Tone		TO
di	Dial Tone		TO
rg	Ringing		TO
hd	On-hook Transition	S	
hu	Off-hook Transition	S	
Trunk Package			
Package Name: T			
Symbol	Definition	R	S
bl	Blocking		BR
lb	Loopback		OO

R	Events	OO	On/Off signal	BF	Brief signal
S	Signals	TO	Time-Out signal	✓	can be requested

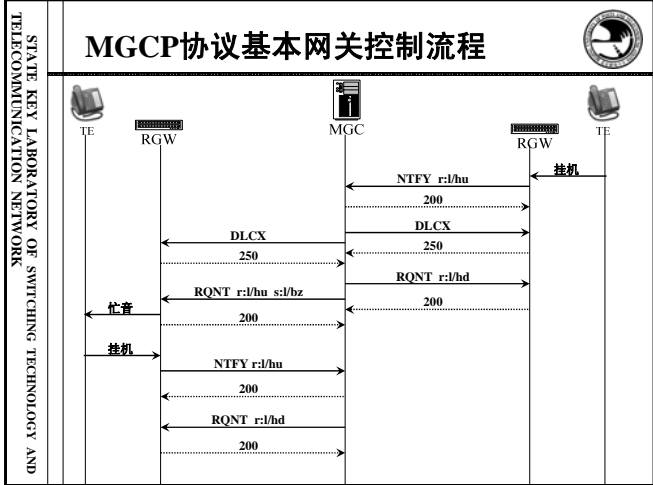
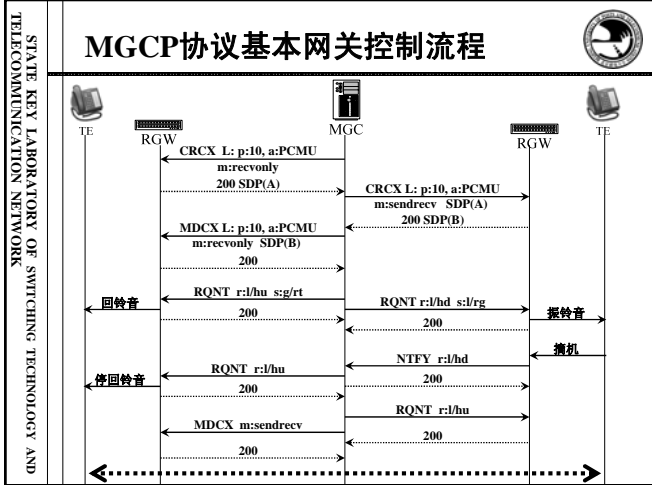
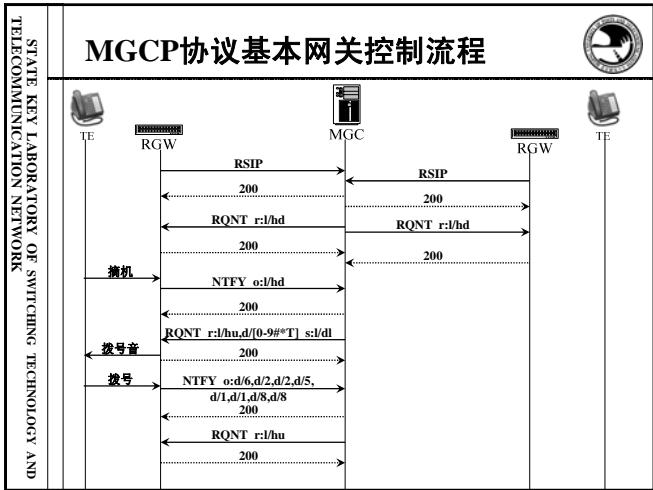
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## MGCP消息举例

<b>RQNT</b> 2050 aaln/1@rgw.com.cn mgcp 1.0 <b>R:</b> L/hu(n), D/[0-9#*T](D) <b>S:</b> L/dl <b>X:</b> 2222 <b>D:</b> (0T)00T#xxxxxxx[*xx]91x[9011x.T)	<b>NTFY</b> 25 aaln/1@rgw.com.cn mgcp 1.0 <b>O:</b> D/9, D/1, D/1 <b>X:</b> 2222
200 2050 ok	200 25 ok

<b>CRCX</b> 2052 aaln/1@rgw.com.cn mgcp 1.0 <b>C:</b> 9876543210 <b>L:</b> p:20,a:PCMU <b>M:</b> sendrecv  v=0 o=1234 4321 IN IP4 100.101.102.103 s=- t=0 0 c=IN IP4 100.101.102.103 m=audio 49170 RTP/AVP 0 a=rtmap:0 PCMU/8000	<b>200</b> 2052 ok <b>I:</b> 0123456789  v=0 o=5678 8765 IN IP4 100.101.102.104 s=- t=0 0 c=IN IP4 100.101.102.104 m=audio 49170 RTP/AVP 0 a=rtmap:0 PCMU/8000
---	---



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## MGCP协议操作总结

- 以“Endpoint”为核心的网关管理
- 以“Connection”为核心的Endpoint管理
  - 以Connection Identifier对应一组“CRCX-MDCX-DLCX”
  - 以Call Identifier维护一组Connection
- 以“Transaction”为基本消息处理单位
- 以Signal和Event为基本控制元素
  - 以Request Identifier对应 RQNT-NTFY
- 以Package完成功能组织

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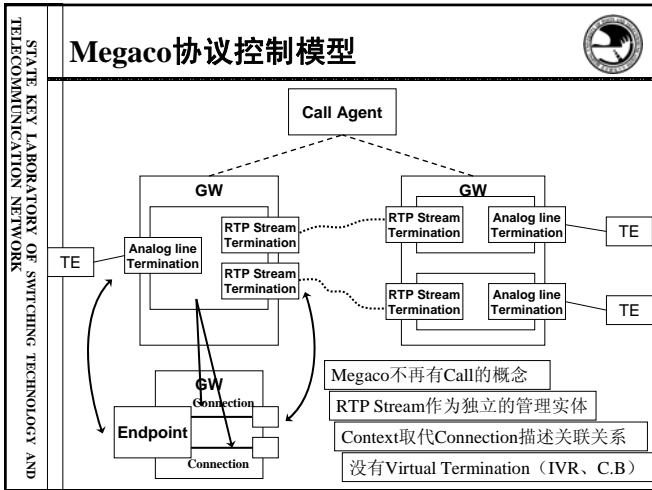
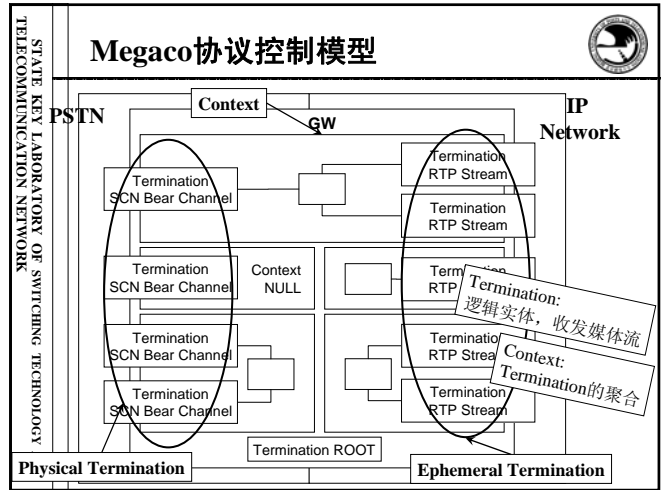
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## Megaco协议分析

- Megaco协议控制模型  
与基本协议分析

## Megaco协议控制模型基本定义

- Connection Model**
  - The connection model for the protocol describes the logical entities, or objects, within the Media Gateway that can be controlled by the Media Gateway Controller.
  - The main abstractions used in the connection model are Terminations and Contexts.
- Termination**
  - A Termination is a logical entity on a MG that sources and/or sinks media and/or control streams.
  - In a multimedia conference, a Termination can be multimedia and sources or sinks multiple media streams.
  - The media stream parameters, as well as modem, and bearer parameters are encapsulated within the Termination.
- Context**
  - A Context is an association between a collection of Terminations.
  - The Context describes the topology (who hears/sees whom) and the media mixing and/or switching parameters if more than two Terminations are involved in the association.
  - There is a special type of Context, the null Context, which contains all Terminations that are not associated to any other Termination.
  - For instance, in a decomposed access gateway, all idle lines are represented by Terminations in the null Context.



## Megaco协议基本操作

### Termination管理

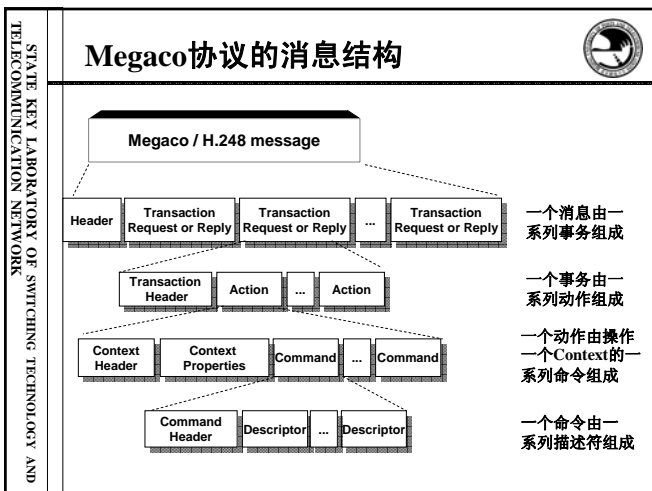
- ServiceChange** 一个 / 一组Termination 加入 / 退出服务
- AuditValue** 获取Termination当前设置的特性、事件、信号、统计信息
- AuditCapabilities** 获取Termination可能的特性、事件、信号、统计信息

### Termination/Context操作

- Add** 向一个Context添加一个Termination
- Modify** 修改一个Termination的特性、事件和信号
- Subtract** 解除一个Termination与Context之间的联系
- Move** Termination在Context之间的移动

### 事件通知

- Notify** 上报MG中发生的事件



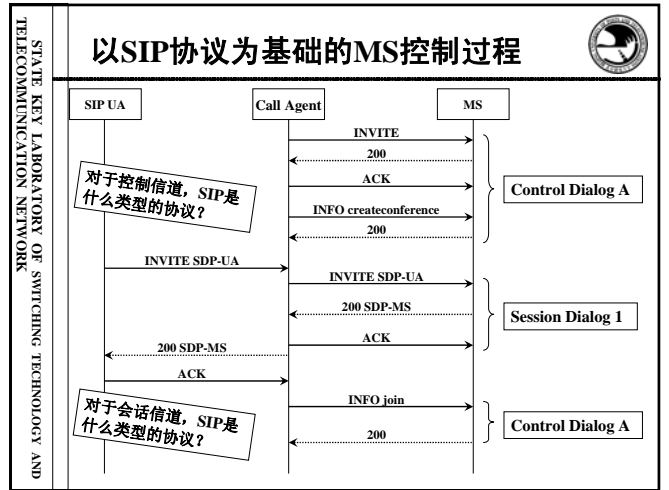
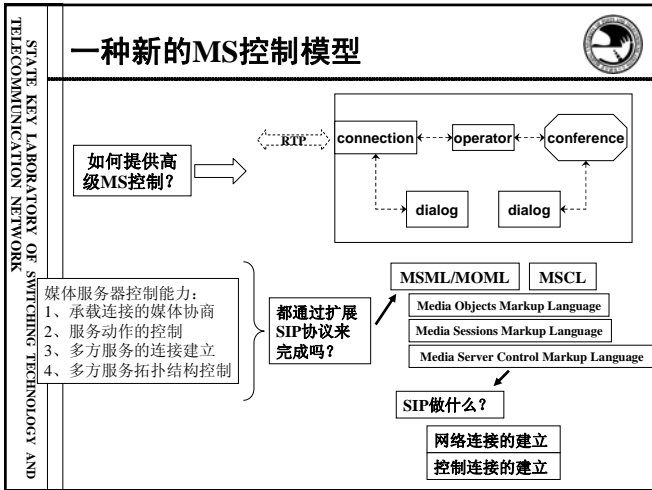
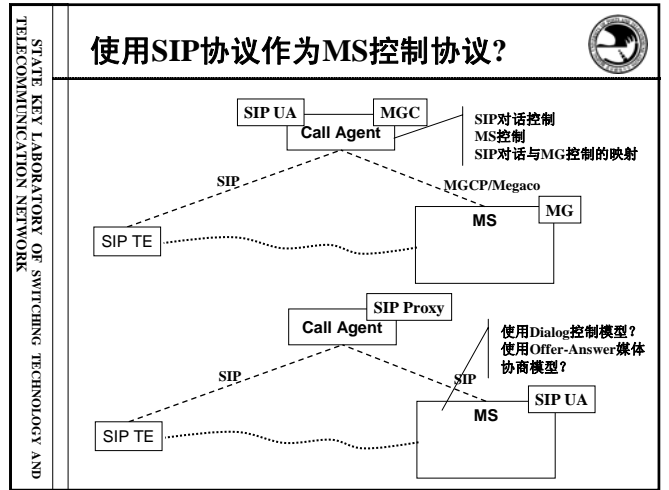
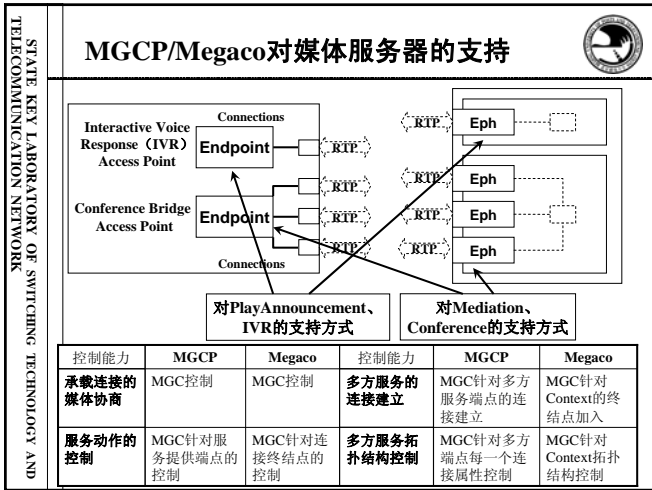
## Megaco的消息处理

```

MEGACO/1 [216.33.33.61]: 27000
Transaction = 1236 {
  Context = {
    Add = TermA {
      }
    }
  Add = $ {
    Media {
      LocalControl {
        Mode = Receiveonly,
      },
      Local {
        v=0
        c=IN IP4 $
        m=audio $ RTP/AVP 4
      }
    }
  }
}

MEGACO/1 [209.110.59.34]: 25000
Reply = 1236 {
  Context = 1 {
    Add = TermA,
    Add=EphA{
      Media {
        Local {
          v=0
          o= 2890844526 2890842807 IN IP4 209.110.59.34
          s=
          t= 00
          c=IN IP4 209.110.59.33
          m=audio 30000 RTP/AVP 4
          a=recvonly
        }
      }
    }
  }
}
  
```





### 如何看待一个协议?

- 从整体角度看问题
- 系统的体系结构模型?
- 协议在体系结构中所处的位置?
- 协议在体系结构中所起的作用?