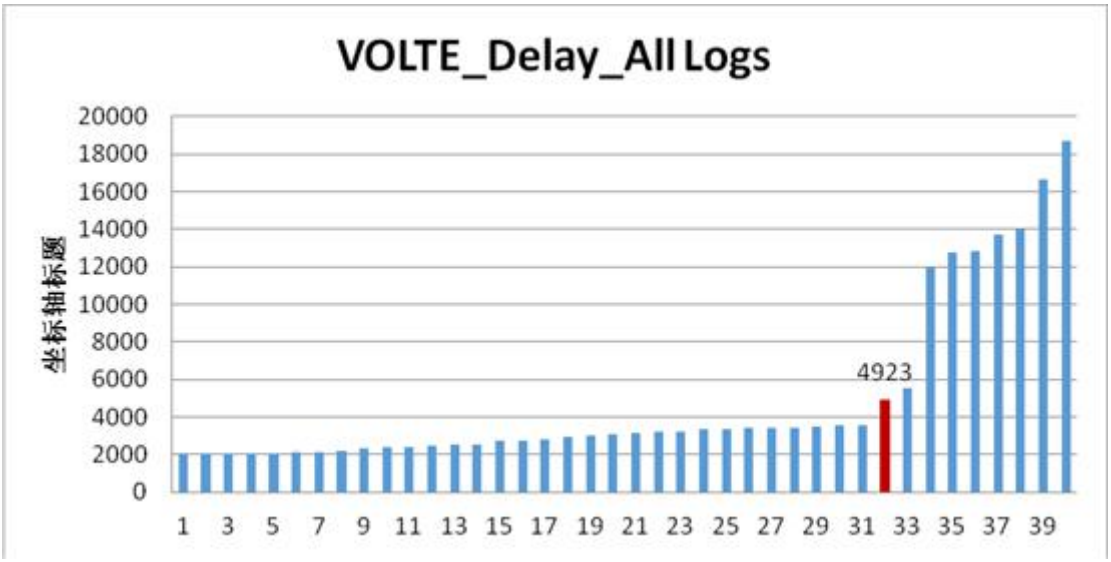
VOLTE 时延超长分析案例

网格 35 拉网平均时延为 4923ms，主要由于存在 8 次异常呼叫时长，排除这 8 次呼叫时延后，平均的呼叫时延为 2769ms，基本正常。历次呼叫时延如下：



呼叫时延较长主要由于其中的 8 次呼叫时延超长，如下：

No.	Longitude	Latitude	DateTime	VOLTE_Delay_All Logs
15	114.06442523	22.54767085	2015-04-11 17:41:05.943	12006
23	114.05309333	22.53751000	2015-04-11 18:09:38.503	12786
20	114.05223333	22.53541032	2015-04-11 17:57:53.398	12843
28	114.04792167	22.53594167	2015-04-11 18:28:46.941	13715
30	114.05325500	22.53954000	2015-04-11 18:36:37.514	13986
5	114.04998667	22.54732667	2015-04-11 17:10:32.658	16643
26	114.05001000	22.53175833	2015-04-11 18:22:36.464	18687

1 分析结果

影响时延的主要有 SBC 向主叫转发 183 信令较慢、一次寻呼未收到、终端因素三种造成时延较大，详情如下：

No.	时延	原因
5	16643	空口正常，但被叫收到寻呼较晚，影响时延
15	12006	SBC 向主叫转发183时延为12s，影响时延
20	12843	SBC 向主叫转发183时延为12s，影响时延
23	12786	SBC 向主叫转发183时延为12s，影响时延
26	18687	空口正常，但被叫收到寻呼较晚，影响6s 左右，同时 SBC 向主叫转发183时延为12s，影响时延，

28	13715	主叫终端回复网络信令异常，影响时延11s 左右
30	13986	SBC 向主叫转发183时延为13s，影响时延

2 呼叫时延异常分析

2.1 呼叫时延异常 1

问题现象：

本次呼叫时延为 16s，主叫在 17:10:16:051 时间发起呼叫，但是在 17:10:31.849 收到 183 主 session progress 消息，可以看出本次呼叫时延长的主要原因是主叫终端收到网络下发的 100 Trying 到收到 183 消息间隔了约 15s，占据了本次呼叫的巨大部分时间，如下图：

MS1	17:10:16.015	UE->Network	IMS_SIP_INVITE	SIP: Request: SIP/2.0 INVITE
MS1	17:10:16.161	Network->UE	IMS_SIP_INVITE	SIP: Response: SIP/2.0 INVITE: 100 trying
MS1	17:10:31.849	Network->UE	IMS_SIP_INVITE	SIP: Response: SIP/2.0 INVITE: 183 session pr
MS1	17:10:31.855	UE->Network	IMS_SIP_PRACK	SIP: Request: SIP/2.0 PRACK
MS1	17:10:31.864	Network->UE	IMS_SIP_INVITE	SIP: Response: SIP/2.0 INVITE: 183 session pr
MS1	17:10:31.867	Network->UE	IMS_SIP_INVITE	SIP: Response: SIP/2.0 INVITE: 183 session pr
MS1	17:10:31.869	Network->UE	IMS_SIP_INVITE	SIP: Response: SIP/2.0 INVITE: 183 session pr
MS1	17:10:31.932	UE->Network	IMS_SIP_UPDATE	SIP: Request: SIP/2.0 UPDATE
MS1	17:10:32.080	Network->UE	IMS_SIP_PRACK	SIP: Response: SIP/2.0 PRACK: 200 ok
MS1	17:10:32.649	Network->UE	IMS_SIP_UPDATE	SIP: Response: SIP/2.0 UPDATE: 200 ok
MS1	17:10:32.652	Network->UE	IMS_SIP_INVITE	SIP: Response: SIP/2.0 INVITE: 180 ringing
MS1	17:10:35.840	Network->UE	IMS_SIP_INVITE	SIP: Response: SIP/2.0 INVITE: 200 ok
MS1	17:10:35.861	UE->Network	IMS_SIP_ACK	SIP: Request: SIP/2.0 ACK
MS1	17:11:31.042	UE->Network	IMS_SIP_BYE	SIP: Request: SIP/2.0 BYE

问题分析：

主叫终端在下发 Invite 后，网络收到后会立即回复 100 Trying，此时 SBC 去寻呼被叫，被叫响应后会向网络回复 183 session progress 消息，从信令上看，主要是寻呼被叫时间很长导致。

从被叫侧看，被叫在 17：10:31.582 收到网络下发的 invite 信令，

MS2	17:10:31.582	Network->UE	IMS_SIP_INVITE	SIP: Request: SIP/2.0 INVITE
MS2	17:10:31.586	UE->Network	IMS_SIP_INVITE	SIP: Response: SIP/2.0 INVITE: 100 trying
MS2	17:10:31.612	UE->Network	IMS_SIP_INVITE	SIP: Response: SIP/2.0 INVITE: 183 session progress
MS2	17:10:36.389	Network->UE	IMS_SIP_PRACK	SIP: Request: SIP/2.0 PRACK
MS2	17:10:36.398	UE->Network	IMS_SIP_PRACK	SIP: Response: SIP/2.0 PRACK: 200 ok
MS2	17:10:36.580	Network->UE	IMS_SIP_UPDATE	SIP: Request: SIP/2.0 UPDATE
MS2	17:10:36.604	UE->Network	IMS_SIP_UPDATE	SIP: Response: SIP/2.0 UPDATE: 200 ok
MS2	17:10:36.629	UE->Network	IMS_SIP_INVITE	SIP: Response: SIP/2.0 INVITE: 180 ringing
MS2	17:10:39.975	UE->Network	IMS_SIP_INVITE	SIP: Response: SIP/2.0 INVITE: 200 ok
MS2	17:10:40.392	Network->UE	IMS_SIP_ACK	SIP: Request: SIP/2.0 ACK
MS2	17:11:25.791	UE->Network	IMS_SIP_BYE	SIP: Request: SIP/2.0 BYE

查看被叫终端层 3 信令看，只到 17:10:31.123 收到了网络侧下发的 paging 消息，随后发起了业务建立

17:10:27.281	BCCH...	eNodeB-...	SystemInformation
17:10:27.290	BCCH...	eNodeB-...	SystemInformation
17:10:31.123	PCCH	eNodeB-...	Paging
17:10:31.123	NAS	MS->eNo...	ServiceRequest
17:10:31.133	UL-C...	MS->eNo...	RRCConnectionRequest
17:10:31.163	DL-C...	eNodeB-...	RRCConnectionSetup

被叫 TMSI 为 C0850F0D，如下图：

```
ue-Identity
  s-TMSI
    mmec:11010110(D6)
    m-TMSI:11000000100001010000111100001101(C0 85 0F 0D)
  establishmentCause:mt-Access (2)
  spare:0(00)
```

查看之前的消息，被叫终端没有收到该终端相关的 paging 消息

17:10:15.761	PCCH	eNodeB-...	Paging
17:10:19.602	PCCH	eNodeB-...	Paging

```
m-TMSI:11110000111011100011100101111001(F0 EE 39 79)
cn-Domain:ps (0)
```

```
m-TMSI:11100000110000000110000011011001(E0 C0 60 D9)
cn-Domain:ps (0)
```

非该用户的TMSI

17:10:20.810	BCCH...	eNodeB-	SystemInformation
17:10:20.810	BCCH...	e	ormationBlockType1
17:10:20.819	BCCH...	e	ormation
17:10:20.830	BCCH...	eNodeB-...	SystemInformation
17:10:20.831	BCCH...	eNodeB-...	SystemInformationBlockType1
17:10:20.841	BCCH...	eNodeB-...	SystemInformation
17:10:20.850	BCCH...	eNodeB-...	SystemInformation
17:10:20.850	BCCH...	eNodeB-...	SystemInformationBlockType1
17:10:20.859	BCCH...	eNodeB-...	SystemInformation
17:10:20.870	BCCH...	eNodeB-...	SystemInformation
17:10:20.871	BCCH...	eNodeB-...	SystemInformationBlockType1
17:10:20.881	BCCH...	eNodeB-...	SystemInformation
17:10:20.890	BCCH...	eNodeB-...	SystemInformation
17:10:27.084	BCCH...	eNodeB-...	MasterInformationBlock
17:10:27.108	BCCH...	eNodeB-...	SystemInformationBlockType1
17:10:27.128	BCCH...	eNodeB-...	SystemInformationBlockType1
17:10:27.147	BCCH...	eNodeB-...	SystemInformationBlockType1
17:10:27.168	BCCH...	eNodeB-...	SystemInformationBlockType1

被叫在接受寻呼时刻的电平为-80dbm 左右 ，信号较好，

Type	PCI	RSRP(dBm)	EA
Serving	17	-80.38	
Detected	202	-103.13	
Detected	397	-100.88	
Detected	154	-111.63	
Detected	397	-101.25	

问题结论：

被叫寻呼响应时间超长导致的时延长现象

被叫终端在信号良好的情况下，未收到寻呼消息 ，但是在此刻时间段内，被叫收到了 2 条其他终端的寻呼消息 ，应该和空口关系不大，需要查看网络侧是否下发了本次呼叫的 paging 消息

优化建议：

需要查看网络是否下发了被叫终端的寻呼消息

2.2 呼叫时延异常 2

问题现象：

本次呼叫时延为 12s，主叫在 17:40:53.938 时间发起呼叫，但是在 17:41:05.053 收到 183 主 session progress 消息，可以看出本次呼叫时延长的主要原因是主叫终端收到网络下发的 100 Trying 到收到 183 消息间隔了约 11s，占据了本次呼叫的绝大部分时间，如下图：

MS1	17:40:53.938	UE->Network	IMS_SIP_INVITE	SIP: Request: SIP/2.0 INVITE
MS1	17:40:54.117	Network->UE	IMS_SIP_INVITE	SIP: Response: SIP/2.0 INVITE: 100 trying
MS1	17:41:05.053	Network->UE	IMS_SIP_INVITE	SIP: Response: SIP/2.0 INVITE: 183 session pro...
MS1	17:41:05.059	UE->Network	IMS_SIP_PRACK	SIP: Request: SIP/2.0 PRACK
MS1	17:41:05.093	UE->Network	IMS_SIP_UPDATE	SIP: Request: SIP/2.0 UPDATE
MS1	17:41:05.316	Network->UE	IMS_SIP_PRACK	SIP: Response: SIP/2.0 PRACK: 200 ok
MS1	17:41:05.915	Network->UE	IMS_SIP_UPDATE	SIP: Response: SIP/2.0 UPDATE: 200 ok
MS1	17:41:05.921	Network->UE	IMS_SIP_INVITE	SIP: Response: SIP/2.0 INVITE: 180 ringing
MS1	17:41:08.931	Network->UE	IMS_SIP_INVITE	SIP: Response: SIP/2.0 INVITE: 200 ok

问题分析：

主叫终端在下发 Invite 后，网络收到后会立即回复 100 Trying，此时 SBC 去寻呼被叫，被叫响应后会向网络回复 183 session progress 消息，被叫信令如下：

被叫在 17:40:56.784 收到 invite 消息后 ，很快在 17:40:56.812 回复了 183 session progress 消息给网络（注：主叫时间比被叫时间早 3s 左右），并在随后建立走完了后续信令，对时延基本无影响。

MS2	17:40:56.784	Network->UE	IMS_SIP_INVITE	SIP: Request: SIP/2.0 INVITE
MS2	17:40:56.787	UE->Network	IMS_SIP_INVITE	SIP: Response: SIP/2.0 INVITE: 100 tryi...
MS2	17:40:56.812	UE->Network	IMS_SIP_INVITE	SIP: Response: SIP/2.0 INVITE: 183 ses...
MS2	17:40:57.539	Network->UE	IMS_SIP_PRACK	SIP: Request: SIP/2.0 PRACK
MS2	17:40:57.543	UE->Network	IMS_SIP_PRACK	SIP: Response: SIP/2.0 PRACK: 200 ok
MS2	17:40:57.778	Network->UE	IMS_SIP_UPDATE	SIP: Request: SIP/2.0 UPDATE
MS2	17:40:57.792	UE->Network	IMS_SIP_UPDATE	SIP: Response: SIP/2.0 UPDATE: 200 ok
MS2	17:40:57.808	UE->Network	IMS_SIP_INVITE	SIP: Response: SIP/2.0 INVITE: 180 rin...
MS2	17:41:11.072	UE->Network	IMS_SIP_INVITE	SIP: Response: SIP/2.0 INVITE: 200 ok
MS2	17:41:11.440	Network->UE	IMS_SIP_ACK	SIP: Request: SIP/2.0 ACK

主叫层 3 信令上看，主叫处于连接态，没有出现掉话等异常现象，排除主叫空口问题

17:40:55.059	UL-D...	MS->eNo...	RRCConnectionReconfigurationCom
17:40:56.025	DL-D...	eNodeB-...	RRCConnectionReconfiguration
17:40:56.028	UL-D...	MS->eNo...	RRCConnectionReconfigurationCom
17:40:57.027	DL-D...	eNodeB-...	RRCConnectionReconfiguration
17:40:57.030	UL-D...	MS->eNo...	RRCConnectionReconfigurationCom
17:40:58.027	DL-D...	eNodeB-...	RRCConnectionReconfiguration
17:40:58.030	UL-D...	MS->eNo...	RRCConnectionReconfigurationCom
17:40:59.030	DL-D...	eNodeB-...	RRCConnectionReconfiguration
17:40:59.033	UL-D...	MS->eNo...	RRCConnectionReconfigurationCom
17:40:59.419	UL-D...	MS->eNo...	MeasurementReport
17:40:59.814	UL-D...	MS->eNo...	MeasurementReport
17:40:59.867	DL-D...	eNodeB-...	RRCConnectionReconfiguration
17:40:59.888	UL-D...	MS->eNo...	RRCConnectionReconfigurationCom
17:40:59.923	BCCH...	eNodeB-...	MasterInformationBlock
17:40:59.937	BCCH...	eNodeB-...	SystemInformationBlockType1
17:40:59.957	BCCH...	eNodeB-...	SystemInformationBlockType1
17:40:59.977	BCCH...	eNodeB-...	SystemInformationBlockType1
17:40:59.997	BCCH...	eNodeB-...	SystemInformationBlockType1
17:41:00.017	BCCH...	eNodeB-...	SystemInformation
17:41:00.210	DL-D...	eNodeB-...	RRCConnectionReconfiguration
17:41:00.211	UL-D...	MS->eNo...	RRCConnectionReconfigurationCom
17:41:00.232	DL-D...	eNodeB-...	RRCConnectionReconfiguration
17:41:00.235	UL-D...	MS->eNo...	RRCConnectionReconfigurationCom
17:41:00.435	UL-D...	MS->eNo...	MeasurementReport
17:41:00.435	UL-D...	MS->eNo...	MeasurementReport
17:41:00.436	UL-D...	MS->eNo...	MeasurementReport
17:41:00.436	UL-D...	MS->eNo...	MeasurementReport
17:41:00.442	DL-D...	eNodeB-...	RRCConnectionReconfiguration
17:41:00.443	UL-D...	MS->eNo...	RRCConnectionReconfigurationCom
17:41:00.751	DL-D...	eNodeB-...	RRCConnectionReconfiguration
17:41:00.752	UL-D...	MS->eNo...	RRCConnectionReconfigurationCom
17:41:00.755	UL-D...	MS->eNo...	MeasurementReport
17:41:00.756	UL-D...	MS->eNo...	MeasurementReport

问题结论：

需要查看 SBC 侧的信令，为何未及时向主叫转发 183 信令。

被叫很快回复了 183 消息，对时延没有影响，但是主叫收到 sbc 下发的 183 消息间隔了 12s 左右 ，需要查看网络侧收到被叫 183 消息后为何没有及时向主叫发 183 消息。

微信扫描以下二维码，免费加入【5G 俱乐部】，还赠送整套：5G 前沿、NB-IoT、4G+（VoLTE）资料。