

ASR5x00:SGSN抑制的擴展位元率下行鏈路引數

目錄

[簡介](#)

[問題](#)

[案例](#)

[案例 1.](#)

[案例 2.](#)

[為什麼無線接入承載\(RAB\)分配失敗？](#)

[因應措施](#)

[相關思科支援社群討論](#)

簡介

本檔案介紹一種特定案例，其中延伸位速率引數遭服務GPRS支援節點(SGSN)抑制。思科聚合服務路由器(ASR)5x00上報告此問題。

問題

漫遊使用者無法在特定循環中進行漫遊時建立分組資料協定(PDP)上下文，因為SGSN拒絕具有資源不足的「原因代碼」欄位的PDP，因為3G漫遊呼叫沒有正確設定。漫遊歸屬位置暫存器(HLR)在最大位元率下行鏈路(DL)中傳送0 kbps值，並且還增加了擴展服務品質(QoS)，與無線接入型別(RAT)型別無關。但是SGSN忽略擴展QoS並以0 kbps向網關GPRS支援節點(GGSN)傳送Create PDP Request消息，從而導致無線接入承載(RAB)分配失敗。

案例

根據第三代合作夥伴計畫(3GPP)技術規範(TS)24.008規範，其明確宣告：

下行鏈路最大位元率，二進位制八位數9 (參見3GPP TS 23.107 [81])

編碼與上行鏈路的最大位元率相同。

如果傳送實體想要指示下行鏈路的最大位元率高於8640 kbps，它必須將二進位制八位數9設定為「11111110」，即8640 kbps，並將最大位元率的值編碼為二進位制八位數15。

在該協定中，對於本檔案所指定的消息，傳送實體不得同時請求下行鏈路最大位元率和上行鏈路最大位元率均為0 kbps。任何收到要求0 kbps的下行鏈路最大位元率和上行鏈路最大位元率的請求的實體均應將其視為語法錯誤 (見第8條)。

案例 1.

HLR傳送8640 kbps，SGSN的行為基於RAT型別。

對於2G:

Thursday October 02 2014
INBOUND>>>> 23:41:57:019 Eventid:87113(0)

==> GSM Mobile Application (MAP) (0x94) (148 bytes)
Component : Invoke(1)
Component Length : Indefinite length format (0x80)
Invoke
Invoke ID
Tag : 0x02
Length : 1 (0x01)
Value : 0x02
Local Operation Code
Tag : 0x02
Length : 1 (0x01)
Value : 0x07
MAP Insert Subscriber Data Request

Ext-QoS Subscribed
Tag : 0x80
Length : 9 (0x09)
Value : 0x01 6b 96 eb fe 74 01 00 00
Allocation/Retention Priority : 1 (0x01)
011. Traffic Class : Interactive Class (0x3)
...0 1... Delivery Order : With delivery order ('yes') (0x1)
.... .011 Delivery of Erroneous SDUs : Erroneous SDUs are not delivered ('no') (0x3)
Maximum SDU Size : 1500 octets (0x96)
Max. bit rate for Uplink : 7424 kbps (0xeb)
Max. bit rate for Downlink : 8640 kbps (0xfe)
0111 Residual BER : 1×10^{-5} (0x7)
.... 0100 SDU Error Ratio : 1×10^{-4} (0x4)
0000 00.. Transfer Delay : Reserved (0x0)
.... ..01 Traffic Handling Priority : Priority Level 1 (0x1)
Guaranteed bit rate for Uplink : Reserved (0x00)
Guaranteed bit rate for Downlink : Reserved (0x00)
Ext2-QoS Subscribed
Tag : 0x82
Length : 3 (0x03)
Value : 0x00 50 00
000. Spare : 0
...0 Signalling Indication : Not optimised for signalling traffic
.... 0000 Source Statistics Descriptor : Unknown (0x0)
Maximum bit rate for Downlink (Extended) : 22 mbps (0x50)
Guaranteed bit rate for Downlink (Extended) : Use the value indicated by the Guaranteed bit rate for downlink (0x00)

Now if we see create PDP request, we can see this is a 2G call, we cannot provide 8640 kbps so SGSN has downgraded and didn't included extended BIT RATE.

Thursday October 02 2014
<<<<OUTBOUND 23:42:00:845 Eventid:116004(3)
GTPC Tx PDU, from 223.224.40.249:19001 to 223.224.40.1:2123 (166)
TEID: 0x00000000, Message type: GTP_CREATE_PDP_CONTEXT_REQ_MSG (0x10)
Message Type: 0x10 (GTP_CREATE_PDP_CONTEXT_REQ_MSG)
Delivery order: 0x2 (Without delivery order ('no'))
Delivery of erroneous SDU: 0x3 (Erroneous SDUs are not delivered ('no'))
Maximum SDU size: 0x96 (1500 octets)
Max bit rate for uplink: 0x73 (472 kbps)
Max bit rate for downlink: 0x73 (472 kbps)
Residual BER: 0x7 ($1/100\ 000 = 1 \times 10^{-5}$)

SDU error ratio: 0x4 (1/10 000 = 1x10⁻⁴)
Transfer delay: 0x01 (10 ms)
Traffic handling priority: 0x1 (Priority level 1)
Guaranteed bit rate (UL): 0xFF (0 kbps)
Guaranteed bit rate (DL): 0xFF (0 kbps)
Spare Octet4: 0x0 (0)
Signalling Indication: 0x0 (No)
Source Statistics Descr: 0x0 (Unknown)
COMMON FLAGS END.
Radio Access Technology: GERAN

對於3G:

Thursday October 02 2014
INBOUND>>>> 23:43:34:993 Eventid:87113(0)

==> GSM Mobile Application (MAP) (0x94) (148 bytes)

MAP Insert Subscriber Data Request
Parameter Sequence Tag

Ext-QoS Subscribed
Tag : 0x80
Length : 9 (0x09)
Value : 0x01 6b 96 eb fe 74 01 00 00
Allocation/Retention Priority : 1 (0x01)
011. Traffic Class : Interactive Class (0x3)
...0 1... Delivery Order : With delivery order ('yes') (0x1)
.... .011 Delivery of Erroneous SDUs : Erroneous SDUs are not delivered ('no') (0x3)
Maximum SDU Size : 1500 octets (0x96)
Max. bit rate for Uplink : 7424 kbps (0xeb)
Max. bit rate for Downlink : 8640 kbps (0xfe)
0111 Residual BER : 1*10⁻⁵ (0x7)
.... 0100 SDU Error Ratio : 1*10⁻⁴ (0x4)
0000 00.. Transfer Delay : Reserved (0x0)
.... ..01 Traffic Handling Priority : Priority Level 1 (0x1)
Guaranteed bit rate for Uplink : Reserved (0x00)
Guaranteed bit rate for Downlink : Reserved (0x00)
Ext2-QoS Subscribed
Tag : 0x82
Length : 3 (0x03)
Value : 0x00 50 00
000. Spare : 0
...0 Signalling Indication : Not optimised for signalling traffic
.... 0000 Source Statistics Descriptor : Unknown (0x0)
Maximum bit rate for Downlink (Extended) : 22 mbps (0x50)
Guaranteed bit rate for Downlink (Extended) : Use the value indicated by the Guaranteed bit rate
for downlink (0x00)

Thursday October 02 2014
<<<<OUTBOUND 23:43:41:388 Eventid:116004(3)
GTPC Tx PDU, from 223.224.40.249:19001 to 223.224.40.1:2123 (168)
TEID: 0x00000000, Message type: GTP_CREATE_PDP_CONTEXT_REQ_MSG (0x10)
Sequence Number:: 0x217C (8572)
CHARGING CHARACTERISTIC ENDS.
END USER ADDRESS FOLLOWS:
PDP Type Organisation: IETF

PDP Type Number: IPv4
Address: Empty
END USER ADDRESS ENDS.
Access Point Name: airtelgprs.com
Max bit rate for uplink: 0xEB (7424 kbps)
Max bit rate for downlink: 0xFE (8640 kbps)
Residual BER: 0x7 (1/100 000 = 1x10⁻⁵)
SDU error ratio: 0x4 (1/10 000 = 1x10⁻⁴)
Source Statistics Descr: 0x0 (Unknown)
Ext Max bit rate (DL): 0x50 (22000 kbps) <<<<<< Included in the message.
Ext Guaranteed bit rate(DL): 0x00 (Reserved)
QOS PROFILE ENDS.
COMMON FLAGS END.
Radio Access Technology: UTRAN

案例 2.

HLR正在傳送8640 kbps。

Thursday October 02 2014
INBOUND>>>> 23:43:34:993 Eventid:87113(0)

==> GSM Mobile Application (MAP) (0x94) (148 bytes)

MAP Insert Subscriber Data Request
Parameter Sequence Tag

Ext-QoS Subscribed
Tag : 0x80
Length : 9 (0x09)
Value : 0x01 6b 96 eb fe 74 01 00 00
Allocation/Retention Priority : 1 (0x01)
011. Traffic Class : Interactive Class (0x3)
...0 1... Delivery Order : With delivery order ('yes') (0x1)
.... .011 Delivery of Erroneous SDUs : Erroneous SDUs are not delivered ('no') (0x3)
Maximum SDU Size : 1500 octets (0x96)
Max. bit rate for Uplink : 7424 kbps (0xeb)
Max. bit rate for Downlink : 8640 kbps (0xfe)
0111 Residual BER : 1*10⁻⁵ (0x7)
.... 0100 SDU Error Ratio : 1*10⁻⁴ (0x4)
0000 00.. Transfer Delay : Reserved (0x0)
.... ..01 Traffic Handling Priority : Priority Level 1 (0x1)
Guaranteed bit rate for Uplink : Reserved (0x00)
Guaranteed bit rate for Downlink : Reserved (0x00)
Ext2-QoS Subscribed
Tag : 0x82
Length : 3 (0x03)
Value : 0x00 50 00
000. Spare : 0
...0 Signalling Indication : Not optimised for signalling traffic
.... 0000 Source Statistics Descriptor : Unknown (0x0)
Maximum bit rate for Downlink (Extended) : 22 mbps (0x50)
Guaranteed bit rate for Downlink (Extended) : Use the value indicated by the Guaranteed bit rate for downlink (0x00)

Thursday October 02 2014
<<<<OUTBOUND 23:43:41:388 Eventid:116004(3)
GTPC Tx PDU, from 223.224.40.249:19001 to 223.224.40.1:2123 (168)
TEID: 0x00000000, Message type: GTP_CREATE_PDP_CONTEXT_REQ_MSG (0x10)
Sequence Number:: 0x217C (8572)
CHARGING CHARACTERISTIC ENDS.

END USER ADDRESS FOLLOWS:
PDP Type Organisation: IETF
PDP Type Number: IPv4
Address: Empty
END USER ADDRESS ENDS.
Access Point Name: airtelgprs.com
Max bit rate for uplink: 0xEB (7424 kbps)
Max bit rate for downlink: 0xFE (8640 kbps)
Residual BER: 0x7 (1/100 000 = 1x10⁻⁵)
SDU error ratio: 0x4 (1/10 000 = 1x10⁻⁴)
Source Statistics Descr: 0x0 (Unknown)
Ext Max bit rate (DL): 0x50 (22000 kbps) <<<<<< Included in the message.
Ext Guaranteed bit rate(DL): 0x00 (Reserved)
QOS PROFILE ENDS.
COMMON FLAGS END.
Radio Access Technology: UTRAN

HLR傳送0 kbps

Tag : 0x94 Length : 9 (0x09) Value : internet Ext-QoS Subscribed Tag : 0x80 Length : 9 (0x09)
Value : 0x01 71 96 fe ff 74 f9 ff ff Allocation/Retention Priority : 1 (0x01) 011. Traffic
Class : Interactive Class (0x3) ...1 0... Delivery Order : Without delivery order ('no') (0x2)
.... .001 Delivery of Erroneous SDUs : No detect ('-') (0x1) Maximum SDU Size : 1500 octets
(0x96) Max. bit rate for Uplink : 8640 kbps (0xfe) **Max. bit rate for Downlink : 0 kbps (0xff)**
>>>> Here sending entity is requesting 0kbps which is less than 8640 kbps and that is why SGSN
ignores the Extended QoS and does not forward it to GGSN
0111 Residual BER : 1*10⁻⁵ (0x7)
.... 0100 SDU Error Ratio : 1*10⁻⁴ (0x4)
1111 10.. Transfer Delay : 4000 ms (0x3e)
.... ..01 Traffic Handling Priority : Priority Level 1 (0x1)
Guaranteed bit rate for Uplink : 0 kbps (0xff)
Guaranteed bit rate for Downlink : 0 kbps (0xff)
Ext2-QoS Subscribed
Tag : 0x82
Length : 3 (0x03)
Value : 0x00 4f 00
000. Spare : 0
...0 Signalling Indication : Not optimised for signalling
traffic
.... 0000 Source Statistics Descriptor : Unknown (0x0)
Maximum bit rate for Downlink (Extended) : 21 mbps (0x4f)
Guaranteed bit rate for Downlink (Extended) : Use the value
indicated by the Guaranteed bit rate for downlink (0x00)

<<<<OUTBOUND 16:01:37:890 Eventid:116004(3)
GTPC Tx PDU, from 223.224.40.249:19134 to 112.110.244.80:2123 (169)
TEID: 0x00000000, Message type: GTP_CREATE_PDP_CONTEXT_REQ_MSG (0x10)
Sequence Number:: 0x07AC (1964)
MSISDN ENDS.
QOS PROFILE FOLLOWS (Length = 13)
Alloc./Retention priority: 0x01 (1)
Spare Octet1: 0x0 (0)
Delay class: 0x4 (Delay class 4 (best effort))
Reliability class: 0x3 (Unack. GTP/LLC, Ack. RLC, Protected data)
Peak throughput: 0x09 (Up to 256 000 octets/s)
Spare Octet2: 0x0 (0)
Precedence class: 0x2 (Normal priority)
Spare Octet3: 0x0 (0)
Mean throughput: 0x1F (Best effort)
Traffic class: 0x3 (Interactive class)

```
        Delivery order: 0x2 (Without delivery order ('no'))
Delivery of erroneous SDU: 0x1 (No detect ('-'))
        Maximum SDU size: 0x96 (1500 octets)
        Max bit rate for uplink: 0xFE (8640 kbps)
Max bit rate for downlink: 0xFF (0 kbps)
        Residual BER: 0x7 (1/100 000 = 1x10^-5)
        SDU error ratio: 0x4 (1/10 000 = 1x10^-4)
        Transfer delay: 0x3E (4000 ms)
Traffic handling priority: 0x1 (Priority level 1)
        Guaranteed bit rate (UL): 0xFF (0 kbps)
        Guaranteed bit rate (DL): 0xFF (0 kbps)
        Spare Octet4: 0x0 (0)
        Signalling Indication: 0x0 (No)
        Source Statistics Descr: 0x0 (Unknown)
QOS PROFILE ENDS.
COMMON FLAGS FOLLOW:
Prohibit Payload Compression: no
        MBMS Service Type: Multicast Service
        RAN Procedures Ready: no
MBMS Counting Information: no
        No QoS negotiation: no
                NRSN: no
        Upgrade QoS Supported: no
        Dual Address Bearer Flag: no
COMMON FLAGS END.
Radio Access Technology: UTRAN
USER LOCATION INFORMATION FOLLOWS:
        LOCATION TYPE: SAI
                MCC: 404
                MNC: 70
                LAC: 39012
        CI/SAC/RAC: 23017
USER LOCATION INFORMATION ENDS.
        MS Time Zone: +5:30
        Daylight Saving Time: +0 hour
                IMEI(SV): 3565340544016110
INFORMATION ELEMENTS END.
```

SGSN根據訪問型別和支援的最大QOS規範運行。SGSN包括擴展最大位元率DL。

根據規範，僅當使用者裝置(UE)/無線網路控制器(RNC)支援超過8640 kbps時，才會包括二進位制八位數15。

在2G的情況下，基站控制器(BSC)不支援更高的QOS，因此不包括擴展位元率。

在漫遊場景中，HLR本身傳送0 kbps，根據3GPP規範，HLR不能以DL位元率傳送0 kbps。

為什麼無線接入承載(RAB)分配失敗？

```
Wednesday October 01 2014
INBOUND>>>>> 15:33:04:419 Eventid:87730(0)

==> Radio Access Network Application Part (RANAP) (21 bytes)
RANAP PDU
```

```

| 0... .... | Ext bit : 0
| .11. .... | Choice index : Outcome (3)
Procedure Code : id-RAB Assignment (0)
Criticality
| 00.. .... | Reject (0)
RAB Assignment Value :
| .001 0001 | Length Determinant : 17
Value :
RAB Assignment Response
| 0... .... | Ext bit : 0
Bit map :
| .0.. .... | RAB Assignment Response Extensions : Not present
RAB Assignment Response IEs
IEs Count : 1
IE : 1
Protocol IE ID : RAB Failed List (35)
Criticality
| 01.. .... | Ignore (1)
RAB Failed List Value :
| .000 1010 | Length Determinant : 10
Value :
IE Container Count : 1
IE Container : 1
IEs Count : 1
IE : 1
Protocol IE ID : RAB Failed Item (34)
Criticality
| 01.. .... | Ignore (1)
RAB Failed Item Value :
| .000 0011 | Length Determinant : 3
Value :
| 0... .... | Ext bit : 0
Bit map :
| .0.. .... | RAB Failed Item Ext IEs : Not present
RAB ID
| ..00 0001 | | 01.. .... | 0x5
Cause
| ..0. .... | Ext bit : 0
| ...0 00.. | Choice index : 0
Radio Network
| .... ..01 | | 0110 .... | invalid-rab-parameters-
combination (23) (0x17)

```

Wednesday October 01 2014

<<<<OUTBOUND 15:33:04:548 Eventid:88113(0)

==>GPRS Mobility/Session Management Message (25 Bytes)

Protocol Discriminator : SM message

1... : TI Flag : (1) allocated by receiver

.000 : TIO : (0)

.... 1010 : Protocol Discriminator : (10)

Message Type: 0x43 (67)

Message : Activate PDP Reject

SM Cause : (26) Insufficient resources

Protocol Configuration Options

Element ID: 39

Length: 20

Configuration Protocol: (0) PPP

Extension Bit : (128)

Protocol/Container ID: (0x8021) Protocol ID: IPCP

Length: 0x10

Protocol/Container Content: 0x03 01 00 10 81 06 70 6e f0 01 83 06 70 6e f0 05

Wednesday October 01 2014

<<<<OUTBOUND 15:33:04:548 Eventid:87731(0)

==> Radio Access Network Application Part (RANAP) (42 bytes)

RANAP PDU

| 0... | Ext bit : 0
|.00. | Choice index : Initiating Message (0)

Procedure Code : id-Direct Transfer (20)

Criticality

| 01.. | Ignore (1)

Direct Transfer Value :

| .010 0110 | Length Determinant : 38

Value :

Direct Transfer

| 0... | Ext bit : 0

Bit map :

| .0.. | Direct Transfer Extensions : Not present

Direct Transfer IEs

IEs Count : 2

IE : 1

Protocol IE ID : NAS PDU (16)

Criticality

| 01.. | Ignore (1)

NAS PDU Value :

| .001 1010 | Length Determinant : 26

Value :

| .001 1001 | Length Determinant : 25

0x8a431a271480802110030100108106706ef0018306706ef005

==>GPRS Mobility/Session Management Message (25 Bytes)

Protocol Discriminator : SM message

1... : TI Flag : (1) allocated by receiver

.000 : TIO : (0)

.... 1010 : Protocol Discriminator : (10)

Message Type: 0x43 (67)

Message : Activate PDP Reject

SM Cause : (26) Insufficient resources

Protocol Configuration Options

Element ID: 39

Length: 20

Configuration Protocol: (0) PPP

Extension Bit : (128)

Protocol/Container ID: (0x8021) Protocol ID: IPCP

Length: 0x10

Protocol/Container Content: 0x03 01 00 10 81 06 70 6e f0 01 83 06 70

6e f0 05

根據24.008，僅當最大位元率DL大於8640 kbps（八位元9）時，才在建立PDP上下文請求中包含八位元15或擴展最大位元率DL。在演化高速資料包接入(HSPA+)中，SGSN支援最高21 mbps，因此，如果您連線到支援超過8640 kbps的高速資料包接入(HSPA)或HSPA+,SGSN有權包括擴展DL位元率，以支援對更高QOS的任何要求，具體取決於您可能用於所需應用的流量類。

如果SGSN要求下行鏈路/上行鏈路大於8700 kbps，則使用最大位元率(MBR)下行鏈路/上行鏈路的擴展資訊元素(IE)。由於常規消息大小不允許傳送超過8640 kbps的值，因此使用擴展MBR IE來傳送附加值。如果MBR擴展不夠，您甚至可以使用MBR Ext-2。

在上一個示例中，常規MBR使用一個八位元傳送0xFE（轉換為8640 kbps），但是將0x50的MBR外部八位元與原始MBR八位元相乘後，它將變成22000 kbps。

在漫遊情況下，HLR提供0 kbps作為其最大位元率DL。

根據規範23.107，最大位元率(kbps):在一段時間內由通用移動電信系統(UMTS)和服務接入點(SAP)傳送給UMTS的最大位數，除以該段時間的持續時間。只要流量遵循令牌桶演算法(其中令牌速率等於最大位元率，桶大小等於最大服務資料單元(SDU)大小)，就可以與最大位元率保持一致。一致性定義不應解釋為所需的實現演算法。令牌桶演算法在annex B中描述。最大位元率是使用者或應用程式可以接受或提供的上限。根據網路條件，可以針對最高「最大位元率」的流量完成所有RAB屬性。

目的:

- 1)將傳送的位元率限制為具有此類限制的應用程式或外部網路
- 2)允許為能夠以不同速率運行的應用程式（例如具有自適應編解碼器的應用程式）定義所需的最大RAB位元率。

如果HLR為漫遊使用者提供0 kbpsx的上限，則SGSN不會根據24.008規範中提到的限制包含擴展位元率。

因應措施

您可以選擇通過對映到預設接入點名稱(APN)來提供預設QOS，以防在HLR中進行更改不可行。

如本示例所示，為漫遊使用者完成的配置更改示例具有預設QoS。對於2G，SGSN預設傳送472kbps，並且其硬編碼：

```
sgsn-global
```

```
imsi-range mcc xxx mnc xx msin first xxxxxxxxxx last xxxxxxxxxx operator-policy < name >
```

```
operator-policy name < name >
```

```
associate call-control-profile < name >
```

```
apn default-apn-profile < name >
```

```
apn-profile < name >
```

```
qos prefer-as-cap local
```

```
qos class interactive mbr-up < value >
```

```
qos class interactive mbr-down < value >
```