Cisco BTS 10200 Softswitch SIP TGRP Query Feature, Release 6.0.3

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The SIP Trunk Group Routing Protocol (TGRP) Query feature enables the Cisco BTS 10200 Softswitch to pass the egress trunk group information to a remote switch. The remote switch uses this information to route the call further into the network.

Note The feature is based on the IETF document *RFC 4904: Representing trunk groups in tel/SIP Uniform Resource Identifiers (URIs)*.

Contents

Overview

The BTS 10200 uses the existing ENUM infrastructure to launch a TGRP query before selecting the route for an incoming call. For more information on ENUM based query, see the *Electronic Number Mapping and Routing* chapter in the *Cisco BTS 10200 Softswitch Routing and Dial Plan Guide*.

The BTS 10200 performs a TGRP query for a called subscriber number on the ENUM server.

- If the query results in a positive response containing the tgrp-ID, trunk-context and domain parameters, the Bts10200 Soft switch routes the call to the remote switch based on trunk-context and domain parameters. Additionally, the BTS 10200 sends the tgrp-ID and trunk-context parameters in the Req-URI of SIP INVITE message to the remote Switch. Subsequently, the remote switch routes the call to the specified trunk based on tgrp-ID parameter.

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- If the query results in a negative response, the BTS10200 Softswitch routes the call based on destination routing.

Using this feature, the BTS 10200 does the following to route a call in the network.

Performs TGRP Query

The BTS10200 performs TGRP query on an ENUM server for a call, when the dialed number is not served by the same BTS10200. The BTS 10200 can perform TGRP query for all call types.

Note The BTS 10200 does not perform TGRP query when the ENUM query is already done.

Routes a Call when TGRP Query Response is Received

After a response is received from the ENUM server, BTS 10200 Softswitch extracts the tgrp-ID and trunk-context parameters from the NAPTR records. It routes the call to the terminating switch based on the trunk group parameters received from ENUM server, and sends the trunk group parameters in the REQ-URI of the outgoing invite message.

The trunk-context parameter also represents the domain of the terminating switch that processes the outgoing invite having the trunk group information.

Receives TGRP Information in an External Invite

When the BTS 10200 receives trunk group information in an incoming invite, it checks if the trunk-context parameter in the invite is provisioned in the trunk-context table of BTS 10200. If it is provisioned, and the trunk-context value matches the one received in the invite, BTS 10200 routes the call to another BTS10200 based on the trunk-grp ID parameter found in the trunk group table.

The trunk group received in the REQ-URI is selected as the outgoing trunk group for the call to be routed out of the BTS 10200.

Note If the trunk-context information in the invite does not match the one provisioned in BTS 10200, BTS 10200 fails the call and does not route it to the default destination.

Figure 1 shows how the TGRP query is performed and the trunk-group information is passed to the remote switch for further processing.
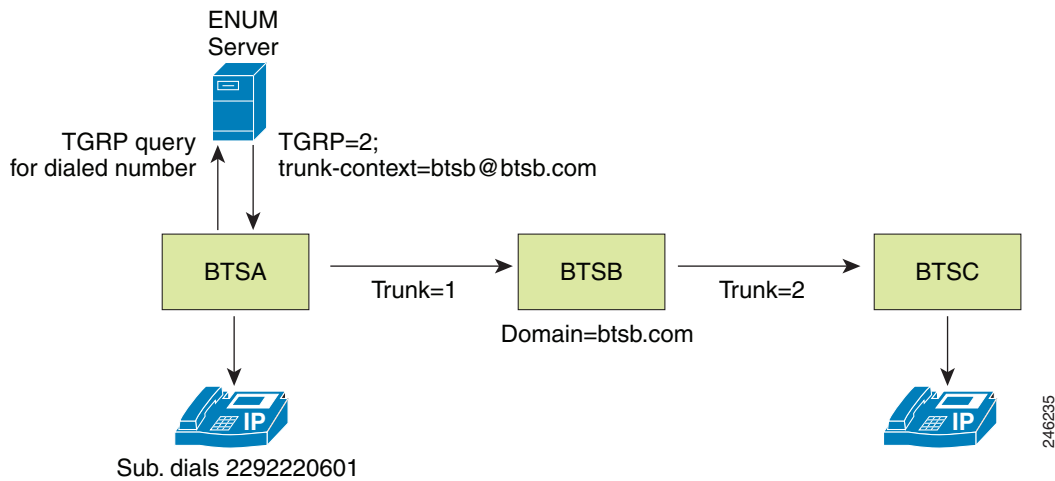
Figure 1   **TGRP Query**

Figure 1 is explained below.

Step 1   A call originates on the BTS-A switch.

Step 2   The BTS-A performs a TGRP ENUM lookup and receives a response from the ENUM server having:

- **tgrp**—Contains the egress trunk-group ID.

Note   The BTS 10200 accepts only numerical values for trunk-group ID.

- **trunk-context**—Contains the domain name of the terminating switch.

    A response from an ENUM server may appear as given below:

    ```
    $ORIGIN 3.2.1.0.5.5.5.5.1.2.1.e164.arpa.
          NAPTR 10 100 "u" "E2U+pstn:sip"
          "!^.*$!sip:+1-215-555-0123;tgrp=2; trunk-context=btsb@btsb.com"
    ```

Step 3   The destination switch (the switch having the domain name matching the value of the trunk-context parameter) in the network, is BTS-B switch, and the trunk group ID is *2*.

The Req-URI in the invite message sent from BTS-A switch towards BTS-B contains the TGRP information (*2*) and trunk-context (*btsb*). The invite message appears as follows:

```
INVITE sip:+1-215-555-0123;tgrp=2;trunk-context=btsb@btsb.com;
```

Call Routing

If the trunk-context information in the TGRP query response is different from the domain, BTS 10200 gives precedence to the domain over the trunk-context while routing the call. If a route is provisioned for the domain (in the **DOMAIN2ROUTE** table), the BTS 10200 uses that route to send the invite message with tgrp parameters.

An example of a TGRP query response is given below.

```
$ORIGIN 3.2.1.0.5.5.5.5.1.2.1.e164.arpa.
NAPTR 10 100 "u" "E2U+pstn:sip"
"!^.*$!sip:+1-215-555-0123;tgrp=1; trunk-context=bts2@bts1.com".
```

In the above example, trunk-context is *bts2* and domain is *bts1*. If the route for *bts1.com* is provisioned in **DOMAIN2ROUTE** table and route for *bts2.com* is not provisioned in **DOMAIN2ROUTE** table, the BTS 10200 uses *bts1.com* to send the invite message.

The SIP invite sent to *bts1.com* would be,

```
INVITE sip:+1-215-555-0123;tgrp=1;trunk-context=bts1@bts1.com;
```

Note If both *bts1.com* and *bts2.com* are provisioned only then invite trunk-context contains *bts2.com@bts1.com*, although routing is on the basis of *bts1.com*.

If no route exists for the domain, the BTS 10200 uses the route provisioned for the trunk-context. If a route is not configured for both domain and trunk-context, the BTS 10200 uses the default destination-based routing to route the call.

Note The route type provisioned for *BTS1.com* and *BTS2.com* should be **ROUTE** or **ROUTE_GUIDE** in the **DOMAIN2ROUTE** table. Otherwise, call is routed using destination-based routing.

Figure 2 shows a visual representation of TGRP query performed by the BTS 10200.

Figure 2　　　**Visual Representation of TGRP Query**
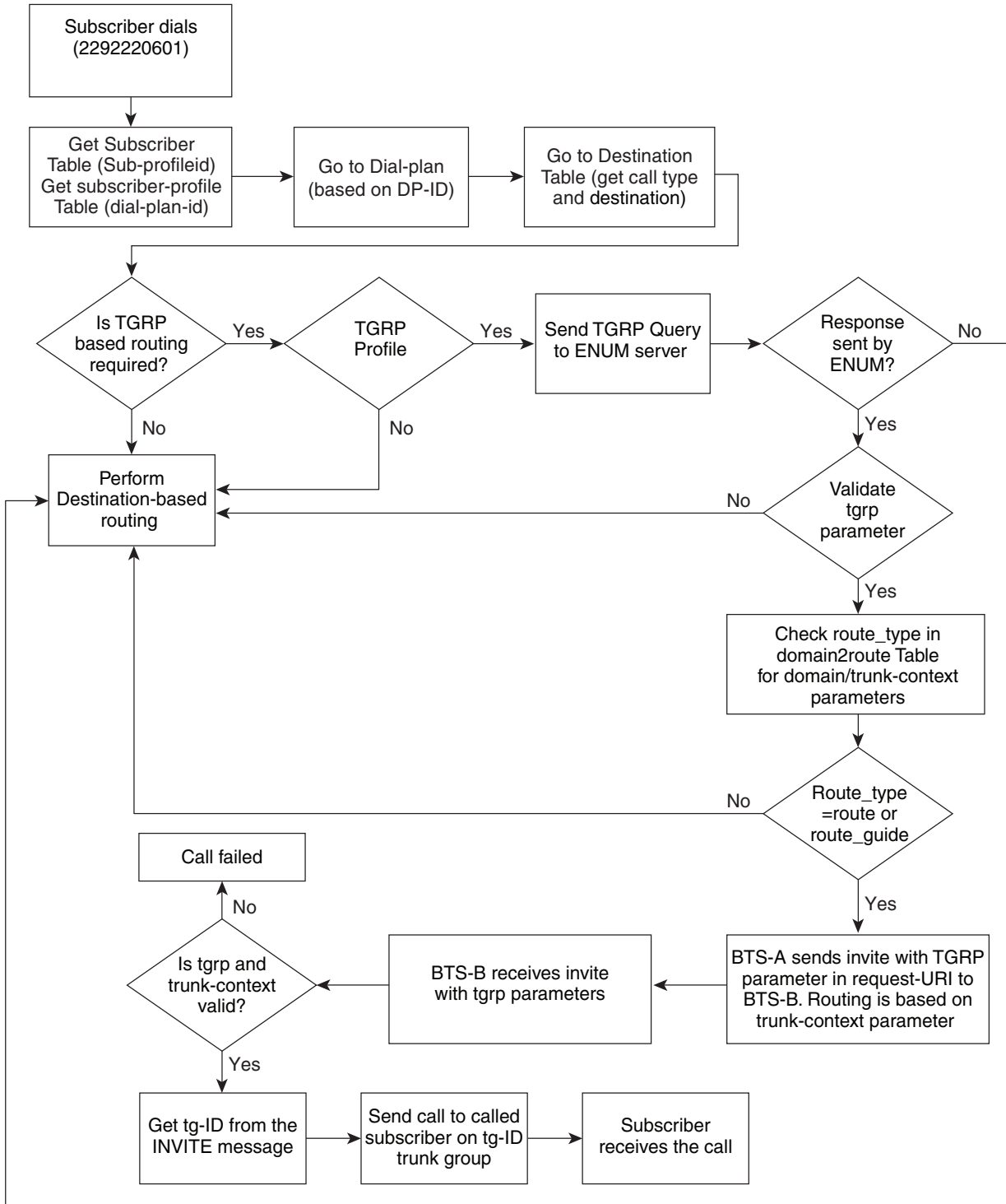
Provisioning the Feature

This section explains how to provision the feature.

✎

Note The commands shown in this section are only examples; you need to enter values that are appropriate for your network and service requirements. The CLI syntax allows you to use commands in uppercase or lowercase. It also allows you to enter hyphens (-) or underscores (_) interchangeably. (Exceptions, if any, are noted in the procedures.)

For a complete list of tokens for each CLI table, as well as the allowed values, default values, and detailed descriptions for each token, see the *Cisco BTS 10200 Softswitch CLI Database* at this website: *http://www.cisco.com/en/US/docs/voice_ip_comm/bts/6.0.3/BTS603_Mainpage.html*

The following new tokens are introduced to support the feature:

Token Name	Description	Type	Values	Mandatory (M)/Optional (O)
TGRP_ENUM_PROFILE_ID	This token is introduced in the **CA_CONFIG** table. It is an ID in the ENUM_PROFILE table, which is used to perform TGRP queries on the ENUM server.	VARCHAR (32)	1 – 32 ASCII characters	O
PERFORM_TGRP_QUERY	This token is introduced in the **CA_CONFIG** table. It determines if TGRP routing by querying the ENUM database should be performed. It also determines whether the TGRP parameters should be sent out on the SIP trunk when the invite is sent out.	char(1)	Y/N Default=N	O
TGRP_TYPE	This token is introduced in the **TRUNK_CONTEXT** table. At the receiving switch, the **TGRP_TYPE** token specifies how to interpret the TGRP received in the SIP invite.	VARCHAR (8)	1 - 8 ASCII CHARACTERS TGRP - Trunk Group Routing Protocol	M
ENUM-QUERY-TYPE	This token is introduced in the **DESTINATION** table. This token specifies whether ENUM query or TGRP query should be performed in the BTS 10200.	enum	ENUM/TGRP Default=ENUM	M

Enabling TGRP Query

To enable the TGRP query in BTS 10200, do these steps.

SUMMARY STEPS

1. **change call_agent_profile**

2. **add ca_config** (to enable tgrp query)

3. **add ca_config** (to add TGRP_ENUM_PROFILE_ID)

4. **add destination**

5. **add domain2route** domain

6. **add trunk_context** trunk_context

DETAILED STEPS

	Command	Purpose
Step 1	**change call_agent_profile** ID= region1cms-1A; ENUM_SUPP =y;	Enables the use of ENUM feature on BTS-A at call-agent level by changing the **ENUM-SUPP** field in **CALL_AGENT_PROFILE** table to *Y.*
Step 2	**add ca_config** type=perform_tgrp_query; value=y;	Enables the use of SIP TGRP feature at call agent level by setting the **PERFORM_TGRP_QUERY** token in **CA_CONFIG** table to *Y.*
Step 3	**add ca_config** type=TGRP_ENUM_PROFILE_ID; value=testENUM;	Adds **TGRP_ENUM_PROFILE_ID** in **CA_CONFIG** table.
Step 4	**add destination** enum-query-type=TGRP;	Specifies the query type as TGRP.
Step 5	**add domain2route** domain=xyz.com;route_type=rid;route_id=567;	Adds the domain in **DOMAIN2ROUTE** table.
Step 6	**add trunk_context** trunk_context=my_domain;tgrp_type=tgrp;tgrp_source=req uri;	Trunk-context entry should be there in trunk-context table.

Provisioning SIP Trunk

Use the following steps to create a trunk group on BTS-A and associate it with the IP address of the BTS-B. The steps also show how to provision the originator's dial plan with the dialed digits associated with the trunk.

SUMMARY STEPS

1. **add softsw_tg_profile**

2. **add sip_element**

3. **add trunk_grp**

4. **add route**

5. **add route_guide**

6. **add destination**

7. **add dial_plan**

8. **add ndc**

9. **add exchange_code**

10. **add office_code**

11. **add serving_domain_name**

12. **add serving_domain_name**

13. **control sip_element**

14. **control trunk_grp**

15. **control trunk_grp**

DETAILED STEPS

	Command	Purpose
Step 1	**add softsw_tg_profile** id=SS_PRO_2;protocol_type=SIP;send_std_trk_grp_uri=Y; trunk_sub_grp_type=tgid;	Adds the Softswitch trunk group profile. The **send_std_trk_grp_uri**=Y indicates that the trunk group parameters (as defined by the *draft-ietf-iptel-trunk-group*) should be used when an invite request is received and when the trunk-sub-grp-type=TGID. Also, the **TRUNK_SUB_GRP_**TYPE should be set to *TGID*. These tokens are specified for sending originating TGRP information in the contact header in the SIP invite.
Step 2	**add sip_element** tsap_addr=BTS-B.cisco.com;	Add BTS-B.cisco.com SIP element.
Step 3	**add trunk_grp** id=6292061;tg_type=SOFTSW;softsw_tsap_addr=BTS-B.cisco.com;dial_plan_id=bts-a;tg_profile_id=SS_PRO_2;call_agent_id=CA146;pop_id=tbhrn29; trunk_sub_grp =6292060;	Add the trunk group and trunk subgroup. The **TRUNK_SUB_GRP** value is required for sending originating TGRP information in the contact header. 6292060 is the originating trunk group ID.
Step 4	**add route** id=6292061;tgn1_id=6292061;	Add a route for the trunk group.
Step 5	**add route_guide** id=SS_RTE_GUIDE_1;policy_type=ROUTE;policy_id=6292061;	Add a route-guide with policy type as ROUTE.
Step 6	**add destination** dest_id=BTS-B_SIP_NATL;call_type=LOCAL;route_type=ROUTE;route_guide_id=SS_RTE_GUIDE_1;	Add a destination. This table defines the call type and the routing information for the dialed digits.
Step 7	**add dial_plan** id=bts-a;digit_string=206222;min_digits=10;dest_id=BTS-B_SIP_NATL;	Add a dial plan for BTS-B.
Step 8	**add ndc** digit_string=206;	Add NDC.
Step 9	**add exchange_code** ndc=206;ec=222;	Add the exchange code.
Step 10	**add office_code** ndc=206;ec=222;dn_group=xxxx;call_agent_id=CA146;	Add the office code.

	Command	Purpose
Step 11	**add serving_domain_name** domain_name=BTS-A.cisco.com;auth_reqd=N;	Add the serving domain name.
Step 12	**add serving_domain_name** domain_name=BTS-B.cisco.com;	Add the serving domain name.
Step 13	**control sip_element** tsap_addr=BTS-B.cisco.com;target_state=ins;	Control the new SIP element to in-service (INS).
Step 14	**control trunk_grp** id=6292061;mode=FORCED;wait=N;target_state=oos;	Control the new trunk group to OOS.
Step 15	**control trunk_grp** id=6292061;mode=FORCED;wait=N;target_state=ins;	Bring the trunk group back to INS.

Similarly, the SIP trunk groups are configured on BTS-B and are associated with the IP address of BTS-A.

Managing the Feature

This section provides information on managing the feature.

Billing Information

When BTS 10200 performs a TGRP query and routes a call based on trunk group information, the billing record displays the OUTGOINGTRUNKCONTEXT field and also updates the existing OUTGOINGTRUNKNUMBER field.

When BTS 10200 receives an invite with the TGRP information, the billing record displays the INCOMINGTRUNKCONTEXT field.

Table 1 lists the new billing record fields introduced in this feature.

Table 1   New Fields in Billing Record

Field Number	Common Name	Field Type	Field Size*	Field Description
268	OUTGOING TRUNK CONTEXT	String	64 bytes	The OUTGOING TRUNK CONTEXT is a field in the billing record which represents the trunk-context value that is sent in the outgoing invite, when TGRP routing takes place.
267	INCOMING TRUNK CONTEXT	String	64 bytes	The INCOMING TRUNK CONTEXT is a field in the billing record which represents the trunk-context value that is received in incoming invite.

Additionally, the existing DATABASEQUERYRETURNEDDATA1 field in the billing record displays the TGRP parameter received from the TGRP query response. It also displays the trunk-context and the domain sent in the outgoing invite REQ-URI.

✎ **Note** If TGRP query is performed but the call is routed based on destination instead of domain or trunk-context received in the response, the DATABASEQUERYRETURNEDDATA1 field displays the values present in the TGRP response that is received from the ENUM server.

Table 2 lists the associated call detail block fields for the feature.

Table 2   Features and the Associated Call Detail Block Fields

Feature Name	Field	Value	Associated Call Detail Block Fields
ENUM TGRP	Database Query Type	ENUM	DatabaseQueryType1, DatabaseQueryType2, or DatabaseQueryType3
	Database Query Time	timestamp	DatabaseQueryTime1, DatabaseQueryTime2, or DatabaseQueryTime3
	Database Query Returned Data	tgrp-ID and trunk_context	DatabaseQueryReturnedData1, DatabaseQueryReturnedData2, or DatabaseQueryReturnedData3
	Result	SUCCESS FAILURE	DatabaseQueryResultCode1, DatabaseQueryResultCode2, or DatabaseQueryResultCode3
	OUTGOINGTRUNK CONTEXT	trunk_context value	
	OUTGOINGTRUNK CONTEXT	trunk_context value	

Additional References

Related Documents

Related Topic	Document Title
Summary of features and usage guidelines for this release	*Cisco BTS 10200 Softswitch Release Notes*
Reference listing of all CLI tables and tokens	Cisco BTS 10200 Softswitch CLI Database
ENUM Capability	*Cisco BTS 10200 Softswitch Routing and Dial Plan Guide*
SIP Trunks	*Cisco BTS 10200 Softswitch SIP Guide*
Call Detail Block File Fields	*Cisco BTS 10200 Softswitch Billing Guide*

Any Internet Protocol (IP) addresses used in this document are not intended to be actual addresses. Any examples, command display output, and figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses in illustrative content is unintentional and coincidental.