C H A P T E R **7**

Routes

Introduction

This chapter describes how to provision the Cisco BTS 10200 Softswitch to communicate with another BTS, PSTN gateway, or another call agent.

Trunk Routing

Table 7-1 provides an example of the steps required to provision the BTS to communicate with an another BTS, a Cisco PSTN gateway, or another call agent and lists example CLI commands with mandatory tokens. Click on each step for a description of the step.

Softswitch trunk group routing is being used in this example of basic trunk group routing. Other trunk group types, for example, SS7 or ISDN, could be used.

Table 7-1   *Trunk Routing Provisioning Steps*

	Task	Description and CLI Command
Step 1	Adding trunk group profiles.	The Softswitch Trunk Group Profile (softsw-tg-profile) table holds all the information specific to a Cisco BTS 10200 Softswitch trunk, such as id, protocol, indicators, and echo suppression. The softsw-tg-profile record can be shared by multiple softswitch trunk groups. (Other trunk groups types use their own profiles.) `add softsw-tg-profile id=softprf1; protocol-type=sip-t; sipt-isup-ver=Q761_HONGKONG;`
Step 2	Adding trunk groups.	The Trunk Group (trunk-grp) table identifies the trunk group and maps it to the associated media gateway. `add trunk-grp id=1; softsw-tsap-addr=sia-trn2CA102.trnglab.cisco.com:5060; call-agent-id=CA101; tg-type=softsw; tg-profile-id=sspf1; cost=3; dial-plan-id=dp1;`

Table 7-1   Trunk Routing Provisioning Steps (continued)

	Task	Description and CLI Command
Step 3	Adding routes.	The Route (route) table contains a list of up to ten trunk groups to route a call. If all the trunk groups are busy or not available, call processing uses the alt-route-id (if specified) to route the call. The Element Management System (EMS) provisions the Call Agent ID field based on the Trunk Group table. `add route id=siprt1; tgn1-id=1;`

Step 4	Adding call types and routes.	The Destination (destination) table defines call type and the routing information for dialed digits.
		
		`add destination dest-id=sip1; call-type=toll;`
		`route-type=route; route-guide-id=siprg1;`

Step 5	Adding dial plans.	Dial plans analyze, screen, and route calls based on dialed digits. The Dial Plan (dial-plan) table holds dial plan information types of calls. It defines valid dialing patterns and determines call routing. All records that share a common dial-plan-profile-id are considered a dial plan.
		
		`add dial-plan id=sub; digit-string=469-255; noa=national;`
		`dest-id=local_call;`

Step 6	Placing a trunk group in service.	`control trunk-gp id=1;mode=forced;target-state=ins;` **Note** There are no trunk terminations associated with BTS trunk groups because these are virtual trunks over IP.

Policy Routing

provides steps to provision policy routing and lists example CLI commands with mandatory tokens.

Table 7-2   Policy Routing Provisioning Steps

	Task	Description and CLI Command
Step 1	Adding routes.	`add route id=dallas1; tgn1-id=dallas-tg; pfx-digits1=972;` `del-digits1=0;`

Step 2	Adding region profiles.	The Region Profile (region-profile) table groups North American Numbering Plan (NANP) digits to an originating region. You can have many ID and digit-string combinations to a given region. Digit patterns (digit-strings) can belong to a region, and originating regions make up a region profile (id). Use the value in the ca-config record as the default region where type=default-region.
		
		`add region-profile id=e911; digit-string=210-470;`
		`region=sanantonio;`

Table 7-2 *Policy Routing Provisioning Steps (continued)*

	Task	Description and CLI Command

Step 3	Adding policy origin dependent routing.	The Policy Origin Dependent Routing (policy-odr) table is used for origin dependent routing. The Numbering Plan Area (NPA) (or NPA-NXX) of the calling party number selects a route. If no match is found based on the calling party number, the route marked as default routes the call.
		
		`add policy-odr id=odr_ID; digit-string=512;`
		`policy-type=tod; policy-id=tod102;`

Step 4	Adding policy originating line routing.	The Policy Originating Line Information (policy-oli) table performs routing based on the originating line information of the calling party number.
		
		`add policy-oli id=normalroute; oli=00; policy-type=tod;`
		`policy-id=holiday;`
		
		Note For the latest information on OLI, see http://www.nanpa.com.

Step 5	Adding policy percent routing.	The Policy Percent (policy-percent) table distributes traffic based on percent allocation. This type of traffic distribution is used primarily for local 8XX routing and Tandem applications.
		
		`add policy-percent id=texaspercent; begin-range1=1;`
		`end-range1=90; policy-type1=tod; policy-id1=tod001;`

Step 6	Adding policy POP routing.	The Policy Point of Presence (policy-pop) table routes a call to the nearest trunk group when there are multiple trunk groups. There are several situations where a policy POP can be used. If a Call Agent serves several POPs, each POP can have its own announcement server. A POP-specific announcement server can be more efficient than a centralized announcement server. InterLATA carriers also have a point of presence in each POP. Route interLATA or international calls to the nearest carrier location using policy POP routing.
		
		`add policy-pop id=car9999; pop-id=dallaspop;`
		`policy-type=tod; policy-id=tod101;`

Step 7	Adding policy prefix routing.	The Policy Prefix (policy-prefix) table provides information for call routing based on the prefix (type of call). Typical call types include 1+ dialing, international calls, and toll-free. This table is used mainly for carrier routing.
		
		`add policy-prefix id=standard; prefix1=national;`
		`policy-type1=tod; policy-id1=tod01;`
		
		Note If you cannot use an 800 number carrier to route an operator call (00), provision the 800 number carrier and the translated number in the Policy-NXX table.

Table 7-2   Policy Routing Provisioning Steps (continued)

	Task	Description and CLI Command
Step 8	Adding policy region routing.	The Policy Region (policy-region) table performs region-based routing. The region is derived using the Region Profile table from the Route Guide table and the calling party number automatic number identification (ANI). If ANI is not available or the Region Profile table is not provisioned, the region assigned to the trunk group is used for trunk origination. If a record cannot be found based on the region, the record with region=default (if provisioned) is used for routing. `add policy-region id=ca200; region=sanantonio; policy-type=tod; policy-id=tod101;`
Step 9	Adding policy TOD routing.	The Policy Time of Day (policy-tod) table provides routing information based on the following values, in order of preference (highest preference to lowest): • Day of year • Day of week • Time of day `add policy-tod id=basictime; doy1=03-01; doy1-policy-type=route; doy1-policy-id=dallasaustin; start-dow1=mon; stop-dow1=fri; start-time1=07:00; stop-time1=17:00; policy-type1=per; policy-id1=texaspercent; default-policy-type=route; default-policy-id=dallasaustin;`
Step 10	Adding policy NXX routing.	The Policy-NXX (policy-nxx) table is used when a number services call results in a translated number, carrier ID, translated number and a carrier ID, or a route ID. `add policy-nxx id=normalroute;`
Step 11	Adding route guides.	`add route-guide id=rg200; policy-type=tod; policy-id=tod101;`
Step 12	Adding destinations.	`add destination dest-id=dallasaustin; call-type=toll; route-type=route; route-guide-id=rg10;`
Step 13	Adding dial plans.	`add dial-plan id=sub; digit-string=972-671; noa=national; dest-id=richardson;`

911 Region Routing

911 region (county) routing connects subscribers' 911 calls to the correct emergency authority based on the physical location of the calling subscriber. The following procedure provides an example of the steps required to provision 911 region (county) routing and lists example CLI commands with mandatory tokens.

Table 7-3 provides steps required to provision 911 routing and lists example CLI commands with mandatory tokens.

Table 7-3   911 Routing Provisioning Steps

	Task	Description and CLI Command
Step 1	Adding emergency and default 911 routes.	`add route id=e911-county1; tgn1-id=1;`
Step 2	Adding route guides.	`add route-guide id=e911rg; policy-type=region;` `policy-id=e911county; region-profile-id=e911;`

Step 3	Adding policy region routing and default routes.	`add policy-region id=e911county; region=county1;`
		`policy-type=route; policy-id=e911-county1;`
		
		Note If region is not available, derive it from the CPN by adding a route guide and adding a region profile for each NPA, NPA-NXX or full 10-digit DN.

Step 4	Adding destinations.	`add destination dest-id=e911dest; call-type=emg;` `route-type=route; route-guide-id=e911rg;`
Step 5	Adding dial plans.	`add dial-plan id=sub; digit-string=911; noa=national;` `dest-id=e911dest;`
Step 6	Adding subscriber profiles.	`add subscriber-profile  id=subpf1; dial-plan-id=sub;`

Origin Dependent Routing (ODR)

The BTS supports ODR-based routing, where the call is routed using the CPN at NPA, NPA-NXX, or NPA-NXX-X(X)(X)(X). Table 7-4 provides steps required to provision ODR routing and lists example CLI commands with mandatory tokens.

Table 7-4   ODR Routing Provisioning Step

	Task	Description and CLI Command
Step 1	Adding route guides.	`add route-guide id=e911rg; policy-type=odr;` `policy-id=e911odr;`
Step 2	Adding policy region routing and default routes.	`add route id=e911npa214; tgn1-id=1;`
Step 3	Adding origin dependent routes for each NPA.	`add policy-odr id=e911odr; digit-string=214;` `policy-type=route; policy-id= e911npa214;`

ODR and Region-Based Routing

Use ODR and region-based routing to perform more complex routing. Table 7-5 provides steps required to provision ODR and region-based routing and lists example CLI commands with mandatory tokens.

Table 7-5   ODR and Region-Based Routing Provisioning Steps

	Task	Description and CLI Command
Step 1	Adding route guides.	`add route-guide id=e911rg; policy-type=odr; policy-id=e911odr;`
Step 2	Adding calls from the 214 area code to be routed based on county.	`add policy-odr id=e911odr; digit-string=214; policy-type=region; policy-id= e911county;`
Step 3	Adding policy region routing for each county specific route.	`add policy-region id=e911county; region=county1; policy-type=route; policy-id=e911-county1;`

Equal Access Routing

This section defines how to set up a subscriber and the BTS for equal access dialing based on interexchange carrier (IXC) carrier PIC. This applies to direct dial domestic (DDD) and international direct dial domestic (IDDD) dialing and dial plans. This procedure can also be applied to local service provider equal access using the PIC2 field in the BTS Subscriber table. This procedure assumes that all residential gateways, trunking gateways, and all other translations support the commands below.

Table 7-6 provides steps required to provision equal access routing and lists example CLI commands with mandatory tokens.

Table 7-6   Equal Access Routing Provisioning Steps

	Task	Description and CLI Command
Step 1	Adding the carrier ID.	This sets up the carrier and puts it in-service. `add CARRIER ID=0288; STATUS=INS; INTER=Y; INTRA=Y; INTL=Y; CASUAL=Y; CUT-THRU=Y; OP-SERVICES=Y; SEND-CN=N; SEND-CSP=Y; USE-DIAL-PLAN=N;`
Step 2	Assigning PIC1 to interlata and international carrier PICs.	This presubscribes a subscriber to a carrier so the subscriber does not have to dial 101+4 digit carrier code + the number to make the call. `change subscriber; id=motfb4/1;name=John Doe;PIC1=0288;PIC2=NONE;PIC3=NONE;`
Step 3	Adding interlata dummy routes.	`add route id=EA-IXC;lcr=n;tgn1-id=null;`
Step 4	Adding route guides.	`add route-guide id=EA-IXC;policy-type=route;policy-id=EA-IXC;`
Step 5	Adding destinations for interlata calls.	`add destination dest-id=Interlata-IXC;call-type=InterLata;route-type=rout; route-guide-id=EA-IXC;`
Step 6	Adding dial plan entries for U.S.-supported NPAs.	This allows verification that a subscriber can call a particular NPA. `add dial-plan id=dp-mot;digit-string=201;reqd-digits=10;dest-id=Interlata-IXC`
Step 7	Adding international dummy routes.	`add route id=INTL-IXC;lcr=n;tgn1-id=null`

Table 7-6 ***Equal Access Routing Provisioning Steps (continued)***

	Task	Description and CLI Command
Step 8	Adding international route guides.	`add route-guide` `id=INTL-IXC;policy-type=route;policy-id=INTL-IXC;`

Step 9	Adding international destinations.	`add destination`
		`dest-id=INTL-IXC;call-type=INTL;route-type=route;route-gui`
		`de-id=INTL-IXC;`

Step 10	Adding international dial plans for country codes.	`add INTL-DIAL-PLAN ID=RTP01; CC=34; MIN-DIGITS=6;` `MAX-DIGITS=16;dest-id=INTL-IXC`

Step 11	Adding SS7 Feature Group D (FGD) equal access trunk groups to the IXC switch.	This builds a trunk to the next service provider.
		`add ss7-tg-profile id=IXC-FGD; type= A7; cot-orig=y;`
		`cot-freq=10;T-IAM=20;`
		`add trunk-grp id=205;call-agent-id=CA146; tg-type=ss7;`
		`dpc=214-110-205;traffic-type=tandem;`
		`sel-policy=DSC;glare=all;tg-profile-id=IXC-FGD;dial-plan-i`
		`d=Incoming;No-answer-tmr=240;CLLI=RLGHIXC;`
		
		Note Consult GR-394 for SS7 parameters that must be sent in SS7 messages through the FGD interface.

Step 12	Adding SS7 trunks to the IXC switch.	This sets up the actual bearer channel.
		`add trunk cic-start=1; cic-end=24; tgn-id=205;`
		`mgw-id=C0201_VISM5; termination-prefix=vism/t1-1/;`
		`termination-port-start=1; termination-port-end=24;`
		`equip trunk-termination tgn-id=205; cic=1-48;`
		
		Note This assumes the trunks will be in service when ready.

Step 13	Adding routes to the IXC switch.	This provides the path to the service provider providing equal access. `add route id=SS7-IXC;lcr=N;tgn1-id=205;`

Step 14	Adding the route guides to the IXC switch.	This is required to route to a service provider.
		`add route-guide id=SS7-IXC; policy-type=route;`
		`policy-id=SS7-IXC;`

Step 15	Adding route guides to the Carrier table.	This provides the path to route directly to a service provider.
		`change CARRIER ID=0288; STATUS=INS; INTER=Y; INTRA=Y;`
		`INTL=Y; CASUAL=Y; CUT-THRU=Y; OP-SERVICES=Y; SEND-CN=Y;`
		`SEND-CSP=Y; USE-DIAL-PLAN=N; route-guide-id=SS7-IXC;`
		
		Note The parameters datafilled above may differ based on the IXC carrier, however, this should be typical data fill for most IXCs.

Step 16	Adding circuit codes (if TNS parameter is required).	`add circuit-code tgn-id=205; nat-cc=9; opr-cc=14;`
		`nat-opr-cc=14; sac-cc=9; da-cc=9;`
		
		Note The parameters above differ based on IXC carrier; however, this table is datafilled only if there are special requirements. BTS default values work for most IXCs.

Equal Access Routing