



## CHAPTER 3

# Data Model

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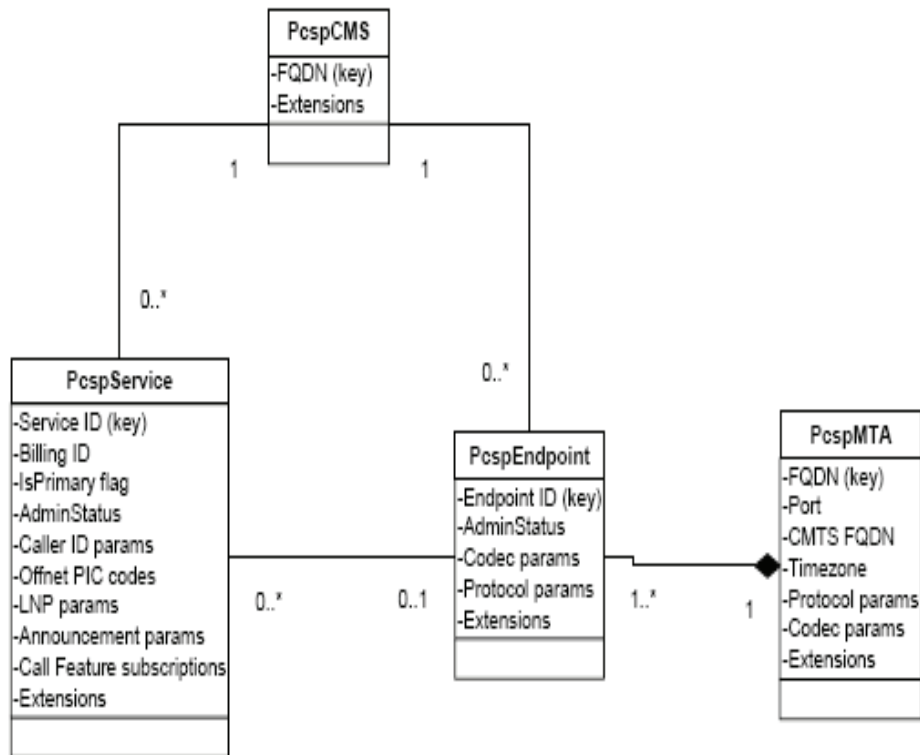
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This document does not cover the basics of PacketCable (PC) data model provisioning. These items are covered in different specifications. Provisioning operations for the Cisco BTS 10200 Softswitch utilize the PKT-PROV-P1 interface only. All objects referenced in this document are considered part of this interface only. Note that all Call Management Server (CMS) references here relate to the Cisco BTS 10200 complex.

## Core Data Model

The Cisco BTS 10200 leverages the basics of the PC data model for subscribers and services. [Figure 3-1](#) shows the defined relationships of the various objects and their references.

Figure 3-1 CMS Provisioning Data Model



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The Cisco BTS 10200 implementation requires the following behavior from these objects:

- The PccspService object is the entity to which a PacketCable 1.5 customer subscribes. It represents a phone number and all related functionality (call features and so on).
- A PccspMta object represents a media terminal adapter (MTA), which aggregates one or more endpoints physically contained within the MTA. For the Cisco BTS 10200 implementation, this object supports the primary protocols such as Session Initiation Protocol (SIP) and Media Gateway Control Protocol (MGCP).
- The PccspEndpoint object represents a physical endpoint on an MTA/Gateway. This object encompasses the behaviors of subscriber terminations (endpoints) in the Cisco BTS 10200 for residential and small business media gateway (MGW) types expressed in the PccspMta.
- A PccspCms object maintains associations between endpoints/CMSs and services/CMSs. This object within the scope of the Cisco BTS 10200 is effectively the foreign key linkage between the endpoint and subscriber. This is already established in the schema of the Cisco BTS 10200. However, this is leveraged for functions like equipage of a subscriber endpoint.
- PccspRelations represent associations between objects. In Figure 3-1, they are presented as connections between objects.

These objects cover the primitives of the following tables. This is not complete coverage of the required fields as defined in the Cisco BTS 10200 system configuration. Therefore, extensions are required to complete the coverage. One key item to note for this interface is that the addition of features is not in scope. Table 3-1 lists the PacketCable object to Cisco BTS 10200 table comparisons.

**Table 3-1 PacketCable Object Name to Cisco BTS 10200 Table Name Comparisons**

PacketCable Object Name	Cisco BTS 10200 Table Name
MTA	MGW
Endpoint	TERMINATION
Service	SUBSCRIBER SUBSCRIBER_SERVICE_PROFILE SERVICE SUBSCRIBER_FEATURE_DATA SLE SC1D SC2D DN2SUBSCRIBER
Cms	CALL_AGENT

## PcspService

The PcspService object must support the following attributes. The following definitions for the field might apply to the view of the PC and not necessarily the Cisco BTS 10200.

- ServiceId—A unique identifier for the service.
- BillingId—The identifier of another service, which will be billed for activity on this service.
- IsPrimary Flag—With multiple services provisioned upon an endpoint, one service *must* have this flag set to indicate the default service to use for outgoing calls.
- PrimaryRingPattern—Index into MTA cadence table and ring pattern selection for this service.
- Administrative status of this service—Suspended, enabled, number has changed. and so forth).
- DisplayName—The display information used for Call Name Delivery feature (CNAM).
- DisplayNumber—The display information used for Call Number Delivery feature (CND).
- Announcement settings—Enable, language, time zone, and so forth.
- Carrier codes—Long distance carrier code, intra-lata carrier code, and international carrier code.
- Local number portability control—Porting status, signal transfer point (STP) lookup flag, and so forth.
- Call features—A service includes a list of subscribed call feature objects
- Extensions—This object is extensible in two locations: the main body of the object and the call feature list.

## PcspMta

The PcspMta object must support the the following attributes:

- MTA's Fully Qualified Domain Name (FQDN), uniquely identifying this MTA.
- MTA's Network-Based Call Signaling protocol (NCS) listener port (default: 2427)
- FQDN of controlling cable modem termination system (CMTS).
- The time zone within which this MTA is physically located.
- Signaling protocol designation—This is the default protocol selection for all contained endpoints, unless overridden by an individual endpoint.
- Codec designation—Default codec selection for all contained endpoints, unless overridden by an individual endpoint.
- Internet Protocol (IP) security (IPSec) Control Flag—The IPSec Control Flag indicates whether IPSec is used for NCS Signaling between the CMS and the MTA. By default, IPSec is turned on for all endpoints, but it can be provisioned on a per endpoint basis.
- MTA Profile Name—Optional; an MTA Profile Indicator identifiable by the CMS.
- A single point for extension.

## PcspEndpoint

The PcspEndpoint object must support the the following attributes:

- EndpointId—Uniquely identifies this endpoint.
- Signaling protocol selection—Optionally overrides MTA setting.
- Administrative status of the endpoint—Disconnected, normal service, test mode, and so forth.
- Codec selection—Optionally overrides MTA setting.
- IPSec Control Flag—Optionally overrides the MTA setting.
- A single point for extension.

## PcspCms

The PcspCms object must support the following attributes:

- FQDN uniquely identifying this CMS
- A single point for extension

## PcspImportExport

The PcspImportExport is a general purpose document format that can contain a large number of objects or relations. It is typically used to export full data sets from a Provisioning Server (PS) to a CMS. The PcspImportExport document format is not a supported object in this release of the Cisco BTS 10200.

## PcspRelation

The PcspRelation is not a supported object in this release of the Cisco BTS 10200.

## Cisco Extensions

To complete the coverage of subscriber management with PacketCable Subscriber Provisioning (PCSP), the required extensions refine the Cisco BTS 10200 vendor-specific behavior and attributes. These are generally part of the basic object listed above. However, there are not enough attributes to cover the full behavioral expression of the Cisco BTS 10200.

The detailed schema definitions of the extensions are listed in [Appendix A, “Cisco BTS 10200 Extensions for Pcp Objects.”](#)

## Standard PCSP Extensions

For a more detailed description of these components and how they relate to the Cisco BTS 10200 database, see the [Cisco BTS 10200 Softswitch CLI Database](#).

## PcspService

This section provides the PcspService extensions.

- sub\_profile\_id—Foreign key: Subscriber Profile table. Subscriber profile ID.
- account\_id—Specifies a subscriber account ID for one or more subscribers. An account id is only for identification purposes. The account ID is not associated with any feature grouping behavior during call processing, although it is included in a billing record.
- address1—Street name, apartment number.
- address2—Street name, apartment number.
- aor\_id—Mandatory and permitted term-type = SIP. Foreign key: Address of Record table. The address of record id. Uses the domain name parser. Domain name portion of the AOR-ID must exist in the Serving Domain Name table. AOR =USER +@+DOMAIN-NAME.
- billing\_type—Specifies the subscriber billing type. Permitted values are
  - FR1—Flat Rate Billing 1
  - FR2—Flat Rate Billing 2
  - MR1—Measured Rate Billing 1
  - MR2—Measured Rate Billing 2
  - NONE (Default)—Billing type is not used

- category—Subscriber category. Permitted values are
  - INDIVIDUAL (Default)—Individual subscriber
  - CTXG—Assigned to the main subscriber ID of a Centrex group
  - CTXG-INDIVIDUAL—Assigned to a Centrex subscriber
  - CTXG-MLHG—Assigned to a Centrex multiline hunt group (MLHG) (for example, attendant)
  - CTXG-TG—Assigned to a Centrex trunk group
  - IVR—Access directory number (DN) for interactive voice response (IVR)
  - MLHG-INDIVIDUAL—Subscriber within an MLHG
  - MLHG—Main subscriber ID of an MLHG
  - MLHG-PREF-INDIV—Main subscriber ID of a preferential hunt list
- PBX—Assigned to the main subscriber ID of a private branch exchange (PBX).
- RACF—Access DN for remote activation of call forwarding (RACF).
- city—Subscriber's city.
- cos\_restrict\_id—Foreign key: class of service (COS) Restrict table. COS restriction ID.
- country—Country of subscriber.
- ctxg\_id—Foreign key: Centrex Group table. Same as ID in Centrex Group table.
- cwt\_type—Call Waiting Tone type. For the Multiple DN (MDN) feature, a different Call Waiting Tone type can be assigned to each DN.
- esrn—Emergency service routing number. The subscriber level emergency service routing number (ESRN) is used if available; otherwise, the ESRN assigned to the subscriber profile is used.
- forced—Use to bypass rule checking during add or change operations. When this extension is used in a delete command, the Cisco BTS 10200 deletes all the information associated with the subscriber from the Subscriber table as well as from all associated tables such as the Subscriber Service Profile table and the Subscriber Feature Data table.
- grp—Specifies whether a subscriber is an individual or a group. Applies to Multiline Hunt or Centrex subscribers. (Default = N.)
  - Y—Group
  - N—Individual
- h323\_term\_id—Mandatory if term-type = H323. Foreign key: H.323 Termination table. The termination ID for an H.323 terminal.
- immediate\_release—Specifies whether to apply the immediate release procedure when a calling party hangs up. (Default = N.)
- mac\_id (EMS only)—A MAC-ID is allowed only if term-type=sip. This token is case sensitive and should be entered in uppercase. Foreign key: MAC to Subscriber table. MAC-ID of SIP (IP) Phone. Specifies the MAC address of the subscriber's SIP phone from which services to control features are invoked.
- mgw\_id—Mandatory and permitted if term-type = term. Foreign key: Media Gateway, Termination tables. Media Gateway ID. The mgw-id is used as a termination ID as well as a combined foreign key to the termination table.
- mlgh\_id—Foreign key: Multiline Hunt Group (MLHG) table. Same as ID in Multiline Hunt Group table.

- `mlhg_pref_list_id`—Foreign key: MLGH Preference List table. Same as ID in MLGH Preference List table.
- `ohd_timer`—Off-hook Delay Timer. If an off-hook trigger is set, the Cisco BTS 10200 looks at the `ohd-timer` token and applies a dial-tone timer equal to `ohd-timer`. If a user dials any digit within this timer value, the remaining digits are collected as normal. If no digit is dialed before the `ohd-timer` expires, the Cisco BTS 10200 Softswitch performs off-hook trigger processing.




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**Note** Applies only if `offhook-trigger-type=OHD`. Default 0, or 2-16 seconds.

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**Note** If 0 is provisioned, then the default value in the Call Agent Configuration table is used.

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- `offhook_trigger_type`—Indicates whether an off-hook trigger applies to this subscriber. A string of 1-8 ASCII characters (Default = NONE). Permitted values are
  - OHD—Off-hook Delay trigger.
  - OHI—Off-hook Immediate trigger.
  - NONE (Default)—No Off-hook trigger.




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**Note** Only allowed if `term-type=term`.

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- `policy_id`—Mandatory and permitted `term-type = SIP`. The route policy id.
- `privacy`—Specifies how calling party information (Name, DN) is displayed to the called party. Permitted values are
  - NONE (Default)—Name and number.
  - FULL—Do not display name or number.
  - NAME—Do not display name.
  - USER—Use user-provided privacy information. Applies only to SIP endpoints that can include privacy information. If information is not received for either name or number, then privacy is indicated as "unspecified." `PRIVACY = USER` is not valid if `term-type = term` or `none`.
- `privacy_manager_id`—Foreign key: Application Server table. The privacy manager id.
- `qos_id`—Foreign key: QOS table. Specifies whether to use QOS index for codec selection.
- `sdt_mwi`—Specifies whether a stutter tone is provided as a Message Waiting Indication. A value of Y or N (Default = Y).
  - Y—A stutter dial tone is provided to a user when the subscriber goes off-hook and subscriber has Message Waiting.
  - N—A stutter dial tone is not provided.
- `secure_fqdn`—(EMS Only.) Permitted only if `term-type=sip`. Use to resolve an IP address and compare it with the IP address received from an endpoint during registration or during call setup (INVITE). A `secure-fqdn` is assigned to the AOR.

- `send_bdn_as_cpn`—Specifies whether to send the billing DN for all calls (EMG, LOCAL, ON-NET, and OFF-NET) as the CPN in the outgoing setup messages. If a billing DN is not provisioned, the billing DN (present) or the DN1 of the main subscriber (for PBX/MLHG subscribers) is sent as the CPN in the outgoing setup message. If none of them are found, the DN1 is sent. The selection of Y or N is permitted. (Default = N.)
  - Y—Send the billing DN of a subscriber as a CPN in the outgoing setup message.
  - N—Send the DN1 of a subscriber as a CPN in the outgoing setup message.
- `send_bdn_for_emg`—Specifies whether to send the billing DN value of emergency calls for PBX over PRI, or CAS and ANALOG, and subscribers information as the CPN in the outgoing setup messages. The selection of Y or N is permitted. (Default = N.)
  - Y—Send the billing DN of the subscriber as a CPN in the outgoing setup message.
  - N—Send the DN1 of the subscriber as a CPN in the outgoing setup message.
- `state`—State designation.
- `static_contact_host`—Hostname portion of the contact id as in `user@hostname`.
- `static_contact_port`—Port number if different from default SIP port number (5060).
- `static_contact_user`—User portion of the contact id as in `user@hostname`.
- `term_id`—Mandatory and permitted `term-type = term`. Unique key. Foreign key: Termination table. Termination ID. Required if `term-type=term`. The `term-id` is used as a termination ID and as a combined foreign key to the termination table.
- `termination_immediate_rel`—Specifies whether a call is immediately released when a called party terminates a call.
- `term_type`—Specifies the termination type. Permitted values are
  - TERM (Default)—MGCP termination
  - TG—Trunk group
  - ROUTE—Route
  - RG—Route guide (Not supported)
  - SIP—SIP termination
  - NONE—There is no termination associated with the subscriber.
  - H323—H.323 virtual termination
- `tgn_id` (or `tg`)—Mandatory and permitted `term-type=tg`. Foreign key: Trunk Group table. Trunk group ID. This field can also be provisioned by the use of `tg` instead of `tgn-id`. The EMS looks up the `tgn-id` based on the trunk group and then provisions it.
- `tg` (or `tgn_id`)—Mandatory and permitted `term-type=tg`. Foreign key: Trunk Group table. Trunk group ID. This field can also be provisioned by the use of `tg` instead of `tgn-id`. The EMS looks up the `tgn-id` based on the trunk group and then provisions it.

- `usage_sens`—Specifies if usage-sensitive features are allowed. Usage-sensitive features are not subscribed but are available for use. The subscribers are charged for each use. The following features are available as usage-sensitive:
  - AR—Automatic recall
  - AC—Automatic callback
  - USTWC—Three-way callingWhere:
  - Y—Usage-sensitive features are allowed.
  - N—Usage-sensitive features are not allowed.
- `vmwi`—The visual message waiting indication. This indication is sent when a message waiting indicator (MWI) notify is received from the voice-mail system.
- `voice_mail_id`—Foreign key: Application Server table. Specifies the default voice-mail id for all subscribers belonging to a subscriber profile.
- `zipcode`—Subscriber's zip code.
- `user_type`—Defines the type of user. Permitted values are
  - IP (Default)
  - PHONE
- `host_ip_address`—IP address of the Element Management System (EMS) machine servicing the response. This extension is only applicable in response object.
- `host_id`—Configured EMS hostname of the EMS machine servicing the response. The extension is only applicable in response object.

## PcspCms

This section provides the PcspCms extensions.

- `id`—Primary key. Call Agent ID (domain name). Service provider assigns, based on network configuration.
- `clli`—Foreign key: CLLI Code table. The Common Language Location Identifier (CLLI) for the Call Agent.
- `mgw_monitoring_enabled`—Media Gateway monitoring enabled/disabled indicator.
- `host_ip_address`—IP Address of the EMS machine servicing the response. This extension is only applicable in response object.
- `host_id`—Configured EMS hostname of the EMS machine servicing the response. This extension is only applicable in response object.

## PcspMta

This section provides the PcspMta extensions.

- `id`—Primary key. Media gateway identifier, assigned by the service provider.
- `type`—Type of gateway.
  - `RGW`—Residential gateway
  - `TGW`—Trunking gateway
- `aggr_id`—ID of the aggregation device cable modem termination system (CMTS). This token is mandatory if PacketCable DQoS is supported; it is how the Cisco BTS 10200 call management server (CMS) determines the CMTS to which a media terminal adapter (MTA) is attached, so it can issue gate control commands to the correct CMTS.
- `node`—Defines the hybrid fiber coax (HFC) fiber node the MTA is homed to. The HFC fiber node sits between the CMTS and the MTA. Every MTA is assigned to a node.
- `host_ip_address`—IP Address of the EMS machine servicing the response. Is only applicable in response object.
- `host_id`—Configured EMS hostname of the EMS machine servicing the response. Is only applicable in response object.

## PcspEndpoint

This section provides the PcspEndpoint extensions.

- `sub_id`—Foreign key: Subscriber table. Subscriber ID of line termination: same as the ID in the Subscriber table.

## PcspObject Common Response

This section provides the PcspObject common responses.

- `timestamp`—The reply is timestamped when the Cisco BTS 10200 EMS is finished processing the request. This extension is only applicable in a response object.
- `reply_string`—Reply string as seen from Cisco BTS 10200 EMS notifying success or failure and details of failure if available. This extension is only applicable in a response object.

## PCSP Standards Compatible Extension for BTS/XML

The extensible markup language (XML) format of data used in the BTS/XML and Common Object Request Broker Architecture (CORBA)/XML interfaces is still valid. The Cisco BTS 10200 provides backward compatible behavior for all existing interfaces and includes support for this data construct as an extension to the PacketCable interface as well.

The full nature of the interface is defined in the following chapters. The schema is defined in [Appendix A, “Cisco BTS 10200 Extensions for Pcsp Objects.”](#)