



Cisco BTS 10200 Softswitch Overlap Dialing Feature Module

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This document describes the Overlap Dialing feature for Release 6.0.1 of the Cisco BTS 10200 Softswitch and explains how to use it.

Understanding the Overlap Dialing Feature

The Overlap Dialing feature reduces the duration of time that the Cisco BTS 10200 takes to process dialed digits that are associated with a non-NANP dial plan. Overlap dialing enables the Cisco BTS 10200 to begin processing a call as soon as it can determine a destination from dialed digits that form only part of a complete number. The ability to determine a destination from a part of a complete number reduces the time that the Cisco BTS 10200 requires to set up a call.

The Cisco BTS 10200 supports Overlap Dialing from a network-based Call Signaling/Media Gateway Control Protocol (NCS/MGCP) endpoint through a SIP trunk to a remote switch. There are four main steps:

1. The Cisco BTS 10200 receives dialed digits from an NCS/MGCP endpoint.
2. The Cisco BTS 10200 determines the route based on the partially dialed number.
3. The Cisco BTS 10200 sends out INVITE with received digits on the selected SIP trunk.
4. The Cisco BTS 10200 transmits the remaining dialed digits one-by-one to complete the call.

When a call from a SIP trunk terminates at a Cisco BTS 10200 NCS/MGCP, the Cisco BTS 10200 receives the overlap dialed digits and then waits for enough digits before terminating the call.



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Feature Interactions

The following table describes how Overlap Dialing interacts with other Cisco BTS 10200 features.

Feature Name	Interaction
Vertical Service Codes, Call Forwarding, Call Forwarding No Answer	Overlap mode is not supported with these features.
Local Number Portability (LNP)	The Cisco BTS 10200 responds to the three types of LNP queries by going into ENBLOC mode to wait for all digits. The three types of LNP query are ACQ (All Call Query), QoR (Query on Release), and OCR (Onward Call Routing).
Toll-Free	The Cisco BTS 10200 queries before sending the digits if all of the following conditions are true: <ul style="list-style-type: none"> • Toll-free dialing is supported • A query is needed • The dial plan has equal min_digits and max_digits
Carrier Prefix	Outside North America, if the carrier prefix is part of the dial plan, the Cisco BTS 10200 supports overlap mode. For example: <ul style="list-style-type: none"> • Carrier prefix = 1010321. The length is 7. • Dialed number = 469 255 4056. The length is 10. The Cisco BTS 10200 requires the first 6 digits to find the route. • Dial plan min_digits = 13 (7 + 6). The max_digits = 17. <p>The call agent (CA) requires 13 digits before it can select a route. The CA sends the SetupReq with these 13 digits to the feature server (FS). The CA sends the rest of the digits one-by-one to the destination switch.</p>
Digit Manipulation (DIGMAN)	In North America the Cisco BTS 10200 performs routing based on the first six digits of a dialed number.
Route-Advance	If Route-Advance is triggered, the Cisco BTS 10200 sends all of the available dialed digits to the next trunk group.
3PCC (Third Party Call Control)	Overlap Dialing is not supported with this feature.
Class of Service/Off-Hook Delayed (COS/OHD)	Overlap Dialing is supported with COS; but, for OHD, the Cisco BTS 10200 operates in ENBLOC mode.
Speed Dial	Overlap Dialing interworks with this feature, but the Cisco BTS 10200 operates in ENBLOC mode.
Redirection	Overlap Dialing interworks with this feature, but the Cisco BTS 10200 operates in ENBLOC mode.
Centrex	Overlap Dialing is not supported with this feature.

Limitations

The Cisco BTS 10200 and the Cisco PGW 2200 must comply with the Cisco BTS 10200 support for Overlap Dialing when the Cisco BTS 10200 and Cisco PGW 2200 are connected over SIP.

Industry Standards

Standard	Title
RFC 3435	Media Gateway Control Protocol (MGCP) Version 1.0
PKT-SP-NCS1.5-I03-070412	PacketCable™ Network-Based Call Signaling Protocol Specification
draft-zhang-sipping-overlap-01	A method for overlap signalling in SIP

Provisioning

To enable the Overlap Dialing feature, carry out the instructions provided in the following sections. New tokens are added to several Cisco BTS10200 CLI Database tables to support Overlap Dialing.

Provisioning Overlap Dialing in the DESTINATION Table

The token OVERLAP_SENDING_SUPP is added to the DESTINATION table.

To enable Overlap Dialing, issue the following command:

```
CLI> add destination dest-id=sip1; call-type=toll; route-type=RID; route-id=siprt1;
overlap_sending_supp=Y;
```

To disable Overlap Dialing, issue the following command:

```
CLI> change destination dest-id=sip1; overlap_sending_supp=N;
```

The default value for the OVERLAP_SENDING_SUPP token is N (no). For a description of the OVERLAP_SENDING_SUPP token, see the information on the DESTINATION table in the [Cisco BTS 10200 Softswitch CLI Database](#).

Provisioning Overlap Dialing in the SOFTSW_TG_PROFILE Table

The token OVERLAP_SUPP is added to the SOFTSW-TG-PROFILE table.

To enable Overlap Dialing for a trunk group on the incoming side, issue the following command:

```
CLI> add softsw-tg-profile id=softprf1; protocol-type=sip; overlap_supp=INCOMING;
```

To enable Overlap Dialing for a trunk group on the outgoing side, issue the following command:

```
CLI> add softsw-tg-profile id=softprf1; protocol-type=sip; overlap_supp=OUTGOING;
```

To enable Overlap Dialing for a trunk group on both the incoming side and outgoing side, issue the following command:

```
CLI> add softsw-tg-profile id=softprf1; protocol-type=sip; overlap_supp=BOTH;
```

To disable Overlap Dialing for a trunk group, issue the following command:

```
CLI> change softsw-tg-profile id=softprfl; overlap_supp=NONE;
```

The default value for the OVERLAP_SUPP token is NONE. For a description of the OVERLAP_SUPP token, see the information on the SOFTSW_TG_PROFILE table in the [Cisco BTS 10200 Softswitch CLI Database](#).

Provisioning Overlap Dialing in the CA_CONFIG_BASE Table

To support Overlap Dialing, you must set the following tokens in the CA_CONFIG_BASE table to the values shown:

- TYPE=OVERLAP-CRITICAL-DIGIT-TIMER
- DATATYPE=INTEGER
- FROM_VALUE=2
- TO_VALUE=20
- CHK_POS_VAL=N
- DEFAULT_VALUE=4
- TYPE=OVERLAP-INTER-DIGIT-TIMER
- DATATYPE=INTEGER
- FROM_VALUE=2
- TO_VALUE=24
- CHK_POS_VAL=N
- DEFAULT_VALUE=16

Provisioning Overlap Dialing in the DIAL_PLAN_PROFILE Table



To support Overlap Dialing, you must set the NANP_DIAL_PLAN token in the DIAL_PLAN_PROFILE table to N (NANP_DIAL_PLAN=N).

Provisioning Overlap Dialing in the DIAL_PLAN Table

To support Overlap Dialing, you must set the NOA token in the DIAL_PLAN table to UNKNOWN (NOA=UNKNOWN).

Provisioning Overlap Dialing for the Sending and Receiving Directions

Use the following provisioning steps to configure Overlap Dialing on the Cisco BTS 10200 for both the sending and receiving directions. If the dialed digits match the prefix string 512378, the Cisco BTS 10200 selects the destination ID of sip1, route ID of siprt1, and trunk group of 11, and sends out the call in an overlapping mode (the OVERLAP_SENDING_SUPP token is set to Yes in the DESTINATION table). On the trunk group side, calls that come in and go out on a trunk group that is associated with a SOFTSW-TG-PROFILE of sspfl support overlap-sending and overlap-receiving.

-
- Step 1** Add a softswitch trunk group profile with the token OVERLAP_SUPP set to INCOMING. This step enables the Cisco BTS 10200 to receive overlapped digits through the associated trunk group.
- ```
add softsw-tg-profile id=sspfl; protocol-type=SIP; non-src-transport=UDP_ONLY;
overlap-supp=BOTH; description=Softswitch TG between PODS;
```
- Step 2** Add a trunk group that is associated with the softswitch trunk group profile. (That is, notice that the value specified for the TG\_PROFILE\_ID token matches the value specified for the ID token in the SOFTSW\_TG\_PROFILE table in Step 1.)
- ```
add trunk-grp id=11; dial-plan-id=dp11;
softsw-tsap-addr=sia-SJ2CA102.trnglab.cisco.com:5060; call-agent-id=CA101;
tg-type=softsw; tg-profile-id=sspfl; clii=austtxcsc01; pop-id=1;
description=Softswitch Trunk Group to Pod2;
```
- Step 3** Add a route that points to the trunk group.
- ```
add route id=siprt1; tgn1-id=11;
```
- Step 4** Add a destination that is associated with the route provisioned in the preceding step. (That is, notice that the value specified for the ROUTE\_ID token matches the value specified for the ID token in the ROUTE table in Step 3.) Set the OVERLAP\_SENDING\_SUPP token to YES to indicate that the Cisco BTS 10200 can send overlapped digits to this destination.
- ```
add destination dest-id=sip1; call-type=toll; route-type=RID; route-id=siprt1;
overlap-sending-supp=Y;
```
- Step 5** Add the dial plan profile.
- ```
add dial-plan-profile id=dp11; nanp-dial-plan=n; description= non north america local
dial plan profile
```
-  **Note** The specification of N for the NANP\_DIAL\_PLAN token is especially important for the correct operation of Overlap Dialing.
- 
- Step 6** Add a dial plan that is associated with destination. (That is, notice that the value specified for the ID token matches the value specified for the ID token in the DIAL\_PLAN\_PROFILE table in Step 5.)
- ```
add dial-plan id=dp11; digit-string=512378; noa=unknown; dest-id=sip1; min-digits=6;
max-digits=10;
```
-  **Note** The specification of UNKNOWN for the NOA token is especially important for the correct operation of Overlap Dialing.
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Provisioning the Dial Plan

To enable the Overlap Dialing feature, you must provision the digit map in the DIGIT_MAP table and the dial plans to work correctly together. The digit map instructs the media gateway (MGW) how to collect and report dialed digits to the gateway adapter. You must provision dial plans to manage the input digits correctly.

For example, the following four subscribers in remote switches are assigned non-fixed telephone number lengths:

- Subscriber 1 has the number of 469-255 at remote switch A.
- Subscriber 2 has the number of 469-256-4 at remote switch B.
- Subscriber 3 has the number of 469-256-5 at remote switch B.
- Subscriber 4 has the number of 469-256-6789 at remote switch B.

You must complete the following provisioning steps to enable overlap dialing.

Step 1 Create a digit map to instruct the MGW to transmit the first 6 digits, which start with the prefix 469.

```
add digit-map id=default; digit-pattern=469xxx;
```

Step 2 Create the softswitch trunk group profiles (softsw-tg-profiles), the trunk groups (trunk-grps), the routes, and destinations for the two remote switches, A and B.

```
add softsw-tg-profile id=sspfA; protocol-type=SIP; non-src-transport=UDP_ONLY;
overlap-supp=NONE; description=Softswitch TG to Switch A with NO Overlap;
```

```
add softsw-tg-profile id=sspfB; protocol-type=SIP; non-src-transport=UDP_ONLY;
overlap-supp=BOTH; description=Softswitch TG to Switch B with Overlap;
```

```
add trunk-grp id=11; dial-plan-id=dp11; noa=unknown; dest-id=xxxx;
softsw-tsap-addr=sia-switchA.trnglab.cisco.com:5060; call-agent-id=CA101;
tg-type=softsw; tg-profile-id=sspfA; clli=austtxcsc01; pop-id=1;
description=Softswitch Trunk Group to Switch A;
```

```
add trunk-grp id=12; dial-plan-id=dp11; noa=unknown; dest-id=xxxx;
softsw-tsap-addr=sia-switchB.trnglab.cisco.com:5060; call-agent-id=CA101;
tg-type=softsw; tg-profile-id=sspfB; clli=austtxcsc02; pop-id=1;
description=Softswitch Trunk Group to Switch B;
```

```
add route id=siprt1; tgn1-id=11;
```

```
add route id=siprt2; tgn1-id=12;
```

```
add destination dest-id=DESTINATION_A; call-type=toll; route-type=RID;
route-id=siprt1; overlap-sending-supp=N;
```

```
add destination dest-id=DESTINATION_B; call-type=toll; route-type=RID;
route-id=siprt2; overlap-sending-supp=Y;
```

Step 3 Create dial plans to route the dialed digits to the correct destination.

```

add dial-plan-profile id=dp11; nanp-dial-plan=n; description=non north america local
dial plan profile

add dial-plan id=dp11; digit-string=469255; min_digits=6; max_digits=10; noa=unknown;
dest-id=xxxx; dest-id=DESTINATION_A

add dial-plan id=dp11; digit-string=469256; min_digits=6; max_digits=10; noa=unknown;
dest-id=xxxx; dest-id=DESTINATION_B

```

After you complete the preceding provisioning steps, the Cisco BTS 10200 processes Overlap Dialing according to the following conditions:

- If the user dials 469255, the MGW sends all six digits 469255 to the MGA. The Cisco BTS 10200 routes the digits to DESTINATION_A with no overlap dialing.
- If the user dials 469256-4, the MGW sends 469256 in the first digitmap to the MGA. The Cisco BTS 10200 routes the initial set of digits to DESTINATION_B, and requests more digits from the MGA/MGW if more digits are available. When the MGW transmits the last digit (4), the Cisco BTS 10200 sends it to the same DESTINATION_B.
- If the user dials 469256-6789, the MGW sends the digits 469256 in the first digitmap to the MGA. The Cisco BTS 10200 routes the initial set of digits to DESTINATION_B, and requests more digits from the MGA if more digits are available. When MGW/MGA transmits the remaining digits (6789), the Cisco BTS 10200 sends them one by one to the same DESTINATION_B.

Additional Dial Plan Provisioning

Using the same four subscribers identified in the preceding section, you can create a different digit map and dial plan combination by completing the following steps:

Step 1 Add a digit map that allows the MGW to send either 5 or 6 digits in the initial transmission.

```
add digit-map id=default; digit-pattern=469xx | 469xxx;
```

Step 2 Add more dial plans to handle initial 3-, 4-, and 5-digit strings. This ensures that the 3-, 4-, and 5-digit dialed strings are matched with a dial plan and not dropped.

```

add dial-plan id=dp11; digit-string=469; min_digits=6; max_digits=10;
dest-id=DESTINATION_B;

add dial-plan id=dp11; digit-string=4692; min_digits=6; max_digits=10;
dest-id=DESTINATION_B;

add dial-plan id=dp11; digit-string=46925; min_digits=6; max_digits=10;
dest-id=DESTINATION_B;

add dial-plan id=dp11; digit-string=469255; min_digits=6; max_digits=10;
dest-id=DESTINATION_A;

add dial-plan id=dp11; digit-string=469256; min_digits=6; max_digits=10;
dest-id=DESTINATION_B;

```

After you create the additional dial plans, the Cisco BTS 10200 processes Overlap Dialing according to the following conditions.

- When the Media Gateway sends 469 only to the Media Gateway Adapter (MGA), the Cisco BTS 10200 finds a dial plan match. However, because the value set for `min_digits` required in the matched dial plan is not reached, the Cisco BTS 10200 does not do anything and waits for the next digit. Therefore, it does not matter what destination was assigned to the `dest-id`. When the next digit is available, the Cisco BTS 10200 uses the accumulated digits to try again to match the longest dial plan.
- The Cisco BTS 10200 applies the same procedure to find a matched dial plan when it receives 4692 and 46925.
- When the Cisco BTS 10200 receives 469255, it waits for all the digits and routes the call in ENBLOC mode to `DESTINATION_A`.



Note In ENBLOC mode, the Cisco BTS 10200 transmits all dialed digits together. Overlap Dialing is not supported in this case. That is, the Cisco BTS 10200 does not send the initial set of digits and then the rest of the digits one by one later.

- When the Cisco BTS 10200 receives 469256, it routes the call in overlapping mode to `DESTINATION_B`. The Cisco BTS 10200 sends the rest of the digits, one by one, to the same `DESTINATION_B`.

Provisioning an NCS/MGCP Endpoint

To provision an NCS/MGCP endpoint to support Overlap Dialing, issue the following command to provide a value for the `TYPE` and `VALUE` tokens in the `CA_CONFIG` table:

```
add ca-config type=LINE-SIDE-OVERLAP-ENABLED;value=Y
```

Operating

Cisco added one new alarm and two new counters to the Cisco BTS 10200 software to support the Overlap Dialing feature.

New Alarm

The SIP adapter (SIA) raises a new alarm if it fails to receive a 184 Response message when expected. The alarm is Possible Overlap Dialing Misconfiguration (`TYPE=SIGNALLING` and `NUMBER=178`).

The Cisco BTS 10200 generates this alarm when a call fails in response to the Cisco BTS 10200 sending an INVITE message (that includes the overlap flag) and also has some additional digits to forward.

New Counters

Cisco added two new counters to the Cisco BTS 10200 software, which the Cisco BTS 10200 pegs when a telephone call is made using overlapping mode.

When the Cisco BTS 10200 sends an overlapping call, the Cisco BTS 10200 can peg the new counter `CALLP_OVL_TX_COUNT` (Overlapped Calls Transmitted). This action occurs when the Cisco BTS 10200 sends the first Subseq message to the terminating adapter.

When the Cisco BTS 10200 receives an overlapping call, the Cisco BTS 10200 can peg the new counter `CALLP_OVL_RX_COUNT` (Overlapped Calls Received). This action occurs when the Cisco BTS 10200 receives the first Subseq message from the originating adapter.

These new counters are at the system level. You can check their status by issuing the following command:

```
CLI> show measurement_callp_summary
.....
CALLP_OVL_TX_COUNT=0
CALLP_OVL_RX_COUNT=0
```

Troubleshooting

To ensure that Overlap Dialing operates correctly, be especially careful not to misprovision the feature. Also, if an IAD is a component of your network, you must provision a specific token in the `MGW_PROFILE` table.

Provisioning Precaution

When enabling Overlap Dialing, you must be careful not to misprovision the feature. For example, if you set the token `OVERLAP_SENDING_SUPP` in the `DESTINATION` table to Y (yes) and the token `OVERLAP_SUPP` in the `SOFTSW-TG-PROFILE` table to NONE or INCOMING, the feature is not provisioned correctly. When the Cisco BTS 10200 attempts to invoke Overlap Dialing for a call, the feature might not transmit all of the dialed digits.

To avoid misprovisioning Overlap Dialing, enable both the `DESTINATION` and `SOFTSW-TG-PROFILE` tables to support sending overlapped digits by setting the token `OVERLAP_SENDING_SUPP` in the `DESTINATION` table to Y and the token `OVERLAP_SUPP` in the `SOFTSW-TG-PROFILE` table to OUTGOING or BOTH.

Alternatively, you can disallow the sending of overlapped digits by setting the token `OVERLAP_SENDING_SUPP` in the `DESTINATION` table to N and the token `OVERLAP_SUPP` in the `SOFTSW-TG-PROFILE` table to NONE or INCOMING.

For a description of the `DESTINATION` table and `SOFTSW-TG-PROFILE` table, see the [Cisco BTS 10200 Softswitch CLI Database](#).

IAD Interworking

If an Integrated Access Device (IAD) is a component of your network, to ensure that the IAD supports Overlap Dialing, set the `MGC_QLOOP` token in the `MGW_PROFILE` table to N.

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