

Configuring ISDN Logical Interface Properties

You configure ISDN services interface properties at the logical unit level. For information about default settings for ISDN logical interface properties, see the *JUNOS Services Interfaces Configuration Guide*.

The dialer interface, `dln`, is a logical interface for configuring dialing properties for a backup ISDN connection. The interface can be configured in two modes:

- Multilink mode using **multilink-ppp** encapsulation. This mode is used when the router supports B-channel bundling (two B-channels connected to provide a 128-Kbps connection) and runs Multilink Point-to-Point Protocol (MLPPP). When the dialer interface (`dln`) is in multilink mode, the value of *n* is from 0 through 149. However, you can only configure one dialer interface with **multilink-ppp** encapsulation. For example, you cannot have both `dl1` and `dl2` as multilink dialers simultaneously. If you need to have multiple multilink dialers, then the values should be `dln.1`, `dln.2`, and so forth.
- Normal mode using **ppp** or **cisco-hdlc** encapsulation. This mode is used when the router is using one B-channel. When the dialer interface (`dln`) is in normal mode, the value of *n* is always from 0 through 149.



NOTE: Ensure that the same IP subnet address is not configured on different dialer interfaces. Configuring the same IP subnet address on different dialer interfaces can result in inconsistency in the route and packet loss. Packets may be routed through any of the dialer interfaces that have the same IP subnet address, instead of being routed through the dialer interface to which the ISDN call is connected.

You can configure the following ISDN services logical interface properties:

- Configuring an ISDN Dialer Interface as a Backup Interface on page 3
- Applying the Dial-on-Demand Dialer Filter to the Dialer Interfaces on page 5
- Configuring Bandwidth on Demand on page 7
- Configuring Dial-In and Callback on page 9
- Configuring Dialer Watch on page 12

The dialer interface cannot be configured:

- As a backup interface and as a dialer filter simultaneously.
- As a backup interface and as a dialer watch simultaneously.
- As a dialer watch interface and as a dialer filter simultaneously.
- As a backup interface for more than one primary interface.

For specific ISDN configuration information for dial-on-demand routing (DDR) and adding Open Shortest Path First (OSPF) demand circuits to a Services Router, see the *JUNOS Routing Protocols Configuration Guide*.

For general information about logical unit properties, see [\[Unresolved xref\]](#). For general information about family inet properties, see [\[Unresolved xref\]](#).

To configure logical interface properties, include the **encapsulation** statement at the **[edit interfaces dln]** hierarchy level and the **dialer-options** statement at the **[edit interfaces dln unit *logical-unit-number*]** hierarchy level:

```
[edit interfaces dln]
encapsulation (cisco-hdlc | multilink-ppp | ppp);
[edit interfaces dln unit logical-unit-number]
dialer-options {
  activation-delay seconds;
  callback;
  callback-wait-period time;
  deactivation-delay seconds;
  dial-string dial-string-numbers;
  idle-timeout seconds;
  incoming-map {
    caller (caller-id | accept-all);
    initial-route-check seconds;
    load-interval seconds;
    load-threshold percent;
    pool pool-name;
    redial-delay time;
    watch-list {
      [ routes ];
    }
  }
}
```

You can configure the following options:

- **activation-delay**—ISDN activation delay, in seconds. Specify a number from 1 through 4294967295.
- **callback**—Configure the dialer to terminate the incoming call and call back the originator after the callback wait period.
- **callback-wait-period**—For interfaces configured for ISDN with callback, specify the amount of time the dialer waits before calling back the caller. The default is 5 seconds.
- **caller**—Specify the dialer to accept a specified caller number or accept all incoming calls.
- **deactivation-delay**—ISDN deactivation delay, in seconds. Specify from 1 through 4294967295.
- [\[Unresolved xref\]](#)—Logical link-layer encapsulation type. For normal mode, specify **cisco-hdlc** for Cisco-compatible High-Level Data Link control (HDLC) or **ppp** for Point-to-Point Protocol. For multilink mode, specify **multilink-ppp**.
- **dial-string**—Phone number to be dialed. Do not include hyphens in number.
- **idle-timeout**—Number of seconds the link is idle before losing connectivity. The default is 120 seconds.

- incoming-map—Specify the dialer to accept incoming calls.



CAUTION: Changing the caller incoming map when a call is connected can create inconsistencies in the route and prevent traffic on a subnet from being transmitted. This is seen when two dialer interfaces are configured and the association of the caller incoming-map from one interface to the other is changed when a call is connected on one of the interfaces. The cause of the inconsistency is that dialer interfaces are pseudo interfaces that are always up, even if not actually connected.

- initial-route-check—Allows the router to check whether the primary route is up after the initial startup of the router is complete and the timer expires.
- load-interval—Interval used to calculate the average load on the network. By default, the average interface load is calculated every 60 seconds. You can specify an interval from 20 through 180 seconds, configurable in intervals of 10 seconds. For more information about the load interval, see “Configuring Bandwidth on Demand” on page 7.
- load-threshold—Bandwidth threshold percentage used for adding interfaces. Another link is added to the multilink bundle when the bandwidth reaches the threshold value you set. Specify a percentage between 0 and 100. When the value is set to 0, all available channels are dialed. The default value is 100.
- pool—For logical and physical ISDN interfaces, specify the dial pool. The dial pool allows logical (dialer) and physical (**br-pim/O/port**) interfaces to be bound together dynamically on a per-call basis. On a dialer interface, **pool** directs the dialer interface which dial pool to use. On a **br-pim/O/port** interface, **pool** defines the pool to which the interface belongs.
- redial-delay—Specify the delay (in seconds) between two successive calls made by the dialer (for dialout). The default is 3 seconds.
- watch-list—IP prefix of one or more routes. The primary route is considered up if there is at least one valid route for any of the addresses in the watch list to an interface other than the backup interface.

Changing the caller incoming map when a call is connected can create inconsistencies in the route and prevent traffic on a subnet from being transmitted. This is seen when two dialer interfaces are configured and the association of the caller incoming-map from one interface to the other is changed when a call is connected on one of the interfaces.

The cause of the inconsistency is that dialer interfaces are pseudo interfaces that are always up, even if not actually connected.

Configuring an ISDN Dialer Interface as a Backup Interface

Configuring the ISDN interface as a backup interface ensures continuous network connectivity. The Services Router can be configured to fail over to the ISDN interface if the primary connection experiences interruptions in Internet connectivity.

To configure an ISDN interface as the backup interface, include the **backup-options** statement at the [edit interfaces *interface-name* unit *logical-unit-number*] hierarchy level:

```
[edit interfaces interface-name unit logical-unit-number]
backup-options {
    interface dln.0;
}
```

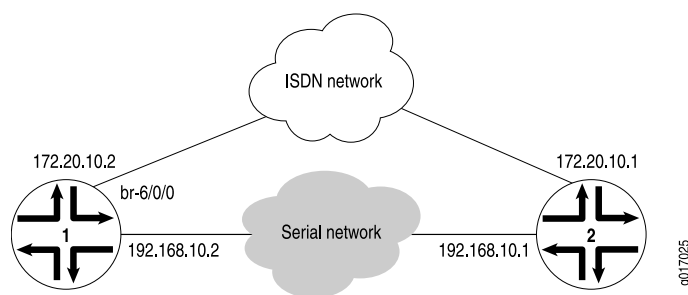
interface-name is the primary interface. The backup interface is specified as *dln*.

Example: Configuring an ISDN Interface as the Backup Interface

The following example illustrates a backup configuration using a primary serial interface, two dialer interfaces, and a physical ISDN interface.

See Figure 1 for the topology used for this example.

Figure 1: ISDN Backup Topology



Configure dialer interface *d10* as the backup interface on the primary serial interface *t1-4/0/1*:

Configuration on the Primary Serial Interface

```
[edit interfaces]
t1-4/0/1 {
    encapsulation ppp;
    backup-options {
        interface d10.0;
    }
    unit 0 {
        family inet {
            address 192.168.10.2;
        }
    }
}
```

Configuration on the Dialer Interface

```
[edit interfaces]
d10 {
    encapsulation ppp;
    unit 0 {
        dialer-options {
            pool 10;
            dial-string 5552222;
            activation-delay 10;
            deactivation-delay 10;
        }
        family inet {
```

```

        address 172.20.10.2 {
            destination 172.20.10.1;
        }
    }
}

```

Configuration on the Physical ISDN Interface

```

[edit interfaces]
br-1/0/0 {
    isdn-options {
        calling-number 5558888;
        spid1 51255511110101 5551111;
        spid2 51255511120101 5551112;
        switch-type ni1;
        t310 70;
    }
    dialer-options {
        pool 10 priority 3;
        pool 2 priority 25;
    }
}

```

Applying the Dial-on-Demand Dialer Filter to the Dialer Interfaces

Dial-on-demand routing (DDR) links two sites over a public network and provides bandwidth. An ISDN connection allows an ISDN line to be activated only when there is network traffic configured as an “interesting” packet. An interesting packet is defined using the firewall filter feature of the Services Router.

To configure DDR, you configure the dialer interface as a passive static route with a lower priority than dynamic routes. If the dynamic route is lost, and a packet destined for that IP address is received, the dialer interface initiates an ISDN connection and sends the packet over it. When no new packets are sent to the destination, the dialer interface initiates an inactivity timer. The ISDN connection is terminated when the timer expires.

There are three steps to configuring dial-on-demand connectivity:

- Define the dialer filter.
- Configure the firewall rule.
- Apply the dialer filter to the dialer interface.

To define the filter, include the **dialer-filter interesting-traffic** statement at the [edit firewall family inet] hierarchy level.

To configure the firewall rule, include the **term** and **from** statements at the [edit firewall family inet dialer-filter *filter-name*] hierarchy level.

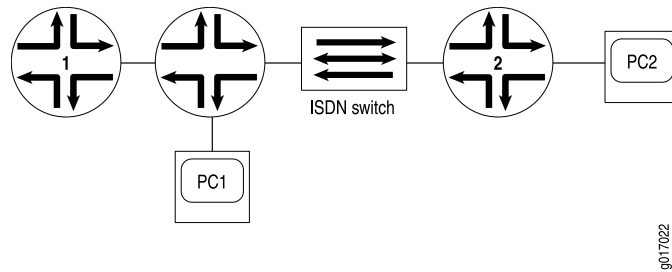
To apply the filter to the dialer interface, include the **filter dialer** statement at the [edit interfaces dln unit *logical-unit-number* family *family*] hierarchy level.

Example: Applying the Dialer Filter

The following example illustrates a dialer filter configuration configured at the [edit firewall family inet] hierarchy level and applied to a physical interface and a dialer interface.

See Figure 2 for the topology used for this example.

Figure 2: Dialer Filter Topology



Configuration for the Dialer Filter

```
[edit firewall family inet]
dialer-filter interesting-traffic {
  term 1 {
    from {
      destination-address {
        100.0.0.50/32;
      }
    }
    then note;
  }
}
```

Configuration on the Dialer Interface

```
[edit interfaces]
d10 {
  encapsulation ppp;
  unit 0 {
    dialer-options {
      pool 1;
      dial-string 350100;
    }
  }
}
family inet {
  filter {
    dialer interesting-traffic;
  }
  address 50.2.0.1/24;
}
```

Configuring Bandwidth on Demand

You can define a bandwidth threshold for network traffic on the Services Router using the dialer interface and ISDN interfaces. Initially, only one ISDN link is active and all packets are sent through this interface. When a predefined bandwidth threshold is reached on this interface, the dialer interface activates another ISDN link and initiates a data connection.

To configure bandwidth on demand, perform the steps in the following sections to configure the dialer interface and the physical ISDN interfaces:

- Configuring the Dialer Interface on page 7
- Configuring the ISDN Interface on page 8
- Example: Configuring Bandwidth on Demand on page 8

Configuring the Dialer Interface

To configure the dialer interface for bandwidth on demand, include the `encapsulation multilink-ppp` statement at the `[edit interfaces dln]` hierarchy level:

```
[edit interfaces]
dln {
  encapsulation multilink-ppp;
}
```

To configure dialer options, include the `dialer-options` statement at the `[edit interfaces dln unit logical-unit-number]` hierarchy level:

```
[edit interfaces dln unit logical-unit-number]
dialer-options {
  dial-string dial-string-numbers;
  load-interval seconds;
  load-threshold percent;
  pool pool-name;
}
```

To configure unit properties, include the `unit logical-unit-number` statement at the `[edit interfaces dln]` hierarchy level:

```
[edit interfaces dln unit logical-unit-number]
family family {
  mtu bytes;
  negotiate-address;
  filter {
    filter-name;
    fragment-threshold bytes;
    mrru bytes;
    ppp-options {
      chap {
        access-profile name;
      }
    }
  }
}
```

```

    }
  }
}

```

You can configure the following unit properties:

- **family**—Protocol family information for the logical interface. For *family*, specify **inet** (for Internet Protocol version 4 [IPv4]) suite.
- **filter**—Dialer filter name. The dialer filter applied here is configured at the [edit firewall family inet] hierarchy level and also applied to the physical ISDN interface.
- **fragment-threshold**—Maximum size, in bytes, for multilink packet fragments. Any nonzero value must be a multiple of 64 bytes. The value can be between 128 and 16320. The default is 0 bytes (no fragmentation).
- **mrru**—Maximum received reconstructed unit (MRRU), in bytes. The value can be between 1500 and 4500. The default is 1500 bytes.
- **negotiate-address**—For interfaces with Point-to-Point Protocol (PPP) encapsulation, enable the interface to be assigned an IP address by the remote end.

Configuring the ISDN Interface

To configure the ISDN interface for bandwidth on demand, include the **pool** statement at the [edit interfaces br-pim/0/port dialer-options] hierarchy level:

```

[edit interfaces br-pim/0/port]
dialer-options {
  pool pool-name;
}

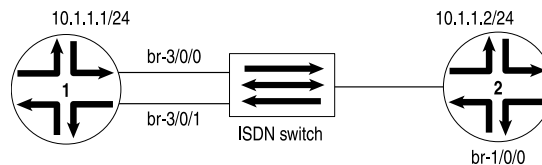
```

Each ISDN interface must use the same dialer pool name to participate in the bandwidth-on-demand configuration.

Example: Configuring Bandwidth on Demand

Figure 3 illustrates a bandwidth-on-demand configuration using multiple physical ISDN interfaces.

Figure 3: Bandwidth-on-Demand Topology



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Configuration for the Dialer Interface

```

[edit interfaces]
d10 {
  encapsulation multilink-ppp;
  unit 0 {

```



```

dialer-options {
    pool 10;
    dial-string 5552222; #Phone number to be dialed
    load-threshold 95;#Dial more ISDN if load exceeds 95% of
    #current capacity
}
fragment-threshold 1024; #Allowed only when dialer is in multilink mode
mrru 1500; #Allowed only when dialer is in multilink mode
encapsulation multilink-ppp;
rtp {
    f-max-period 100;
    queues q3;
}
}
family inet {
    negotiate-address;
}
}

```

Configuration for the First Physical ISDN Interface

```

[edit interfaces]
br-1/0/0 {
    isdn-options {
        switch-type ni1;
    }
    dialer-options {
        pool 1;
    }
}

```

Configuration for the Second Physical ISDN Interface

```

[edit interfaces]
br-1/0/1 {
    isdn-options {
        switch-type ni1;
    }
    dialer-options {
        pool dialer-pool1;
    }
}

```

Configuring Dial-In and Callback

You can configure dial-in on the dialer interface to permit incoming calls. Using dial-in, all incoming calls on a BRI interface are mapped to a dialer interface based on a caller ID. The incoming call's caller ID is compared against all caller IDs configured on all dialers to find the valid match. Multiple caller IDs can be configured on a dialer interface. The same caller IDs cannot be configured on different dialers.

Instead of accepting incoming calls, you can configure the dialer interface to call back the caller. When callback is configured, the call is rejected, and after a brief delay the caller is called back using the dial-string configured on the dialer interface. Multiple dial-strings cannot be configured on a dialer when callback is configured.

To configure dial-in or callback, perform the steps in the following sections to configure the dialer interface and the physical ISDN interfaces:

- Configuring Dial-In on page 10
- Disabling Dial-In on page 10
- Configuring Callback on page 11
- Example: Configuring Dial-In and Callback on page 11

Configuring Dial-In

To configure the dialer interface for dial-in operation, include the `incoming-map` statement with options at the [edit interfaces `dlIn` unit *logical-unit-number* dialer-options] hierarchy level:

```
[edit interfaces dlIn unit logical-unit-number]
dialer-options {
  incoming-map {
    caller (caller-id | accept-all);
  }
}
```



NOTE: The `incoming-map` statement is mandatory for the router to accept any incoming ISDN calls.

Include the option `accept-all` to accept all incoming calls. You can configure the `accept-all` option for only one of the dialer interfaces associated with an ISDN physical interface. The dialer interface with the `accept-all` option configured will be used only if the incoming call's caller ID does not match against the caller IDs configured on other dialer interfaces.

Include the `caller caller-id` statement to configure the dialer interface to accept calls from a specific caller ID. You can configure a maximum of 15 caller IDs per dialer interface.

The same caller ID cannot be configured on different dialer interfaces. However, you can configure a subset of the caller ID configured on another dialer interface. For example, you can configure the caller IDs 14085551515, 4085551515, and 5551515 on different dialer interfaces.

Disabling Dial-In

When dial-in is configured on the Services Router, incoming ISDN calls are accepted by the Services Router. However, you can configure the Services Router to reject all incoming ISDN calls when dial-in is configured.

To configure the Services Router to reject incoming ISDN calls, include the `reject-incoming` statement at the [edit system processes `isdn-signaling`] hierarchy level:

```
[edit system processes isdn-signaling]
```

```
reject-incoming;
```

For more information about disabling dial-in, see the *JUNOS System Basics Configuration Guide* and the *J-series Services Router Basic LAN and WAN Access Configuration Guide*.

Configuring Callback

To configure the dialer interface to call back a specific caller, include the `caller caller-id` statement and the `callback` statement at the [edit interfaces *dln* unit *logical-unit-number* dialer-options] hierarchy level:

```
[edit interfaces dln unit logical-unit-number]  
dialer-options {  
  incoming-map {  
    caller caller-id;  
    callback;  
    callback-wait-period time;  
  }  
}
```

Include the optional `callback-wait-period` statement to change the time at which the dialer interface calls back the caller. The default period is 5 seconds.

Before configuring the callback on a dialer interface, ensure that:

- The dialer interface is not configured as a backup for a primary interface.
- The dialer interface does not have a watch list configured.
- Only one dial string is configured for the dialer interface.
- Dial-in is configured on the dialer interface of the remote router that is dialing in.

Example: Configuring Dial-In and Callback

The following illustrates configurations for dial-in and callback operations.

Configuration to Accept All Incoming Calls

```
[edit interfaces]  
dlo {  
  encapsulation ppp;  
  unit 0 {  
    dialer-options {  
      dial-string 7031231282;  
      incoming-map;  
      accept-all;  
    }  
    pool 2;  
    family inet {  
      address 10.1.1.2;  
    }  
  }  
}
```

**Configuration to Accept
Calls from a Specific
Caller ID**

```
[edit interfaces]
dIO {
  encapsulation ppp;
  unit 0 {
    dialer-options {
      incoming-map {
        caller 14082711234;
      }
      pool 1;
      family inet {
        address 20.1.1.1;
      }
    }
  }
}
```

**Configuration to Call
Back Calls from a
Specific Caller ID**

```
[edit interfaces]
dIO {
  encapsulation ppp;
  unit 0 {
    dialer-options {
      incoming-map {
        caller 14082711234;
      }
      callback;
      callback-wait-period 2;
      pool 1;
      family inet {
        address 20.1.1.1;
      }
    }
  }
}
```

Configuring Dialer Watch

Dialer watch is a feature that integrates backup dialing with routing capabilities and provides reliable connectivity without relying on “interesting” packets to trigger outgoing ISDN connections. With dialer watch, the Services Router monitors the existence of a specified route and if the route fails, the dialer interface initiates the ISDN connection as a backup connection.

To configure dialer watch, perform the steps in the following sections to configure the dialer interface and the physical ISDN interface:

- Configuring the Dialer Interface on page 13
- Configuring the Physical Interface on page 13
- Example: Configuring Dialer Watch on page 13
- Example: Complete ISDN Called-Calling Router Configuration on page 14

Configuring the Dialer Interface

To configure the dialer interface for dialer watch, include the following statements at the [edit interfaces dln] and the [edit interfaces dln unit *logical-unit-number*] hierarchy levels:

```
[edit interfaces]
dln {
  [Unresolved xref] (cisco-hdlc | multilink-ppp | ppp);
  [Unresolved xref] (up | down) milliseconds;
  unit logical-unit-number {
    dialer-options {
      activation-delay seconds;
      deactivation-delay seconds;
      dial-string dial-string-numbers;
      [Unresolved xref] seconds;
      initial-route-check seconds
      pool pool-name;
      watch-list {
        [ routes ];
      }
      family family {
        ip-address;
      }
    }
  }
}
```

Configuring the Physical Interface

To configure the physical interface for dialer watch, include the pool statement at the [edit interfaces br-pim/0/port dialer-options] hierarchy level:

```
[edit interfaces]
br-pim/0/port {
  dialer-options {
    pool name;
  }
}
```

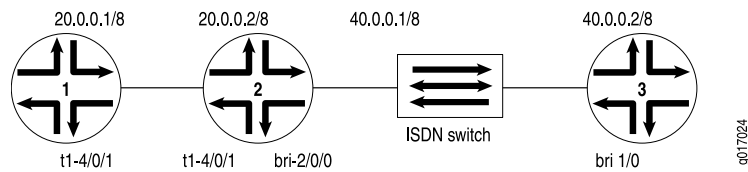
Each physical interface must use the same pool to participate in dialer watch.

Example: Configuring Dialer Watch

The following example illustrates a dialer watch configuration using one physical interface and one dialer interface.

See Figure 4 for the topology used in this example.

Figure 4: Dialer Watch Topology



Configuration for the Physical Interface

```
[edit interfaces]
br-2/0/0 {
  isdn-options {
    switch-type ntdms100;
  }
  dialer-options {
    pool 1 priority 1;
  }
}
```

Configuration for the Dialer Interface

```
[edit interfaces]
dlo {
  unit 0 {
    dialer-options {
      pool 1;
      dial-string 384030;
      watch-list {
        2.2.2.2/24;
        3.3.3.3/24;
      }
    }
  }
  family inet {
    address 40.0.0.1/8;
  }
}
```

Example: Complete ISDN Called-Calling Router Configuration

This example configures the calling J-series router (R1) and the calling J-series router (R2). The routers are both directly connected to an ISDN switch.

Configuration of Calling Router (R1)

```
[edit]
system {
  login {
    user isdn {
      uid 2000;
      class super-user;
      authentication {
        encrypted-password "$1$IS8Vkg3V$tzySvfBSZh1vYHSZQ6fM1";
        ## SECRET-DATA
      }
    }
  }
}
services {
  web-management {
    http;
```

```

    }
  }
}

interfaces {
  fe-0/0/0 {
    unit 0 {
      family inet {
        address 192.168.1.1/24;
      }
    }
  }
  br-3/0/0 {
    traceoptions {
      flag q921;
      flag q931;
      file {
        isdn_logg;
      }
    }
    isdn-options {
      switch-type etsi;
      spid1 116;
    }
    dialer-options {
      pool 100;
    }
  }
  dl100 {
    encapsulation ppp;
    unit 0 {
      dialer-options {
        pool 100;
        dial-string 119;
      }
      family inet {
        filter {
          dialer nss;
        }
        address 10.1.1.1/24;
      }
    }
  }
}

firewall {
  family inet {
    dialer-filter nss {
      term 1 {
        from {
          destination-address {
            10.1.1.0/24;
          }
        }
      }
    }
    then note;
  }
}

```

```

    }
  }
}

access {
  profile isdn {
    client isdn chap-secret "$9$Lpax7VsYoGUHwsP5F39C"; ## SECRET-DATA
  }
}

```

Configuration of Called Router (R1)

```

[edit]
system {
  root-authentication {
    encrypted-password "$1$UfcFhjcm$ftfgaLjMgRvFhrT3obrHu."; ## SECRET-DATA
  }
  services {
    web-management {
      http {
        interface [ fe-0/0/0.0 fe-0/0/1.0 ];
      }
    }
  }
  syslog {
    user * {
      any emergency;
    }
    file messages {
      any any;
      authorization info;
    }
    file interactive-commands {
      interactive-commands any;
    }
  }
}

interfaces {
  br-0/0/4 {
    isdn-options {
      switch-type etsi;
      spid1 119;
      tei-option power-up;
    }
    dialer-options {
      pool 100;
    }
  }
  dl100 {
    encapsulation ppp;
    unit 0 {
      dialer-options {
        pool 100;
        dial-string 116;
        incoming-map {

```



```

        caller 116;
    }
}
family inet {
    filter {
        dialer nss;
    }
    address 10.1.1.2/24;
}
}
}
}

firewall {
    family inet {
        dialer-filter nss {
            term 1 {
                from {
                    address {
                        10.1.1.0/24;
                    }
                }
                then note;
            }
        }
    }
}
}
}

```

