MobileNext Broadband Gateway

Address Assignment and Dynamic Host Configuration Protocol (DHCP)

Published: 2012-04-11

Juniper Networks, Inc.
1194 North Mathilda Avenue
Sunnyvale, California 94089
USA
408-745-2000
www.juniper.net

MobileNext Broadband Gateway Address Assignment and Dynamic Host Configuration Protocol (DHCP)

The information in this document is current as of the date on the title page.

YEAR 2000 NOTICE

Juniper Networks hardware and software products are Year 2000 compliant. Junos OS has no known time-related limitations through the year 2038. However, the NTP application is known to have some difficulty in the year 2036.

END USER LICENSE AGREEMENT

The Juniper Networks product that is the subject of this technical documentation consists of (or is intended for use with) Juniper Networks software. Use of such software is subject to the terms and conditions of the End User License Agreement ("EULA") posted at http://www.juniper.net/support/eula.html. By downloading, installing or using such software, you agree to the terms and conditions of that EULA.

Table of Contents

List of Tables

About the Documentation

Documentation and Release Notes

To obtain the most current version of all Juniper Networks® technical documentation, see the product documentation page on the Juniper Networks website at http://www.juniper.net/techpubs/.

If the information in the latest release notes differs from the information in the documentation, follow the product Release Notes.

Juniper Networks Books publishes books by Juniper Networks engineers and subject matter experts. These books go beyond the technical documentation to explore the nuances of network architecture, deployment, and administration. The current list can be viewed at http://www.juniper.net/books.

Supported Platforms

For the features described in this document, the following platforms are supported:

- MX240 Routers
- MX960 Routers
- MX480 Routers

Documentation Conventions

Table 1 on page viii defines notice icons used in this guide.

Table 1: Notice Icons

Icon	Meaning	Description
	Informational note	Indicates important features or instructions.
	Caution	Indicates a situation that might result in loss of data or hardware damage.
	Warning	Alerts you to the risk of personal injury or death.
	Laser warning	Alerts you to the risk of personal injury from a laser.

Table 2 on page viii defines the text and syntax conventions used in this guide.

Table 2: Text and Syntax Conventions

Convention	Description	Examples
Bold text like this	Represents text that you type.	To enter configuration mode, type the **configure** command: user@host> **configure**
`Fixed-width text like this`	Represents output that appears on the terminal screen.	`user@host>` **show chassis alarms** `No alarms currently active`
Italic text like this	• Introduces important new terms. • Identifies book names. • Identifies RFC and Internet draft titles.	• A policy *term* is a named structure that defines match conditions and actions. • *Junos OS System Basics Configuration Guide* • RFC 1997, *BGP Communities Attribute*
Italic text like this	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# **set system domain-name** *domain-name*
Text like this	Represents names of configuration statements, commands, files, and directories; interface names; configuration hierarchy levels; or labels on routing platform components.	• To configure a stub area, include the **stub** statement at the **[edit protocols ospf area area-id]** hierarchy level. • The console port is labeled **CONSOLE**.
< > (angle brackets)	Enclose optional keywords or variables.	**stub** <**default-metric** *metric*>**;**

Table 2: Text and Syntax Conventions *(continued)*

Convention	Description	Examples
| (pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	**broadcast | multicast** (***string1*** **|** ***string2*** **|** ***string3***)
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	**rsvp { # Required for dynamic MPLS only**
[ ] (square brackets)	Enclose a variable for which you can substitute one or more values.	**community name members [** ***community-ids*** **]**

Indention and braces ({ })	Identify a level in the configuration hierarchy.	[edit]
		routing-options {
		  static {
		  route default {
		  nexthop *address*;
		  retain;
		  }
		  }
		}

; (semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
J-Web GUI Conventions		
Bold text like this	Represents J-Web graphical user interface (GUI) items you click or select.	• In the Logical Interfaces box, select **All Interfaces**. • To cancel the configuration, click **Cancel**.
> (bold right angle bracket)	Separates levels in a hierarchy of J-Web selections.	In the configuration editor hierarchy, select **Protocols>Ospf**.

Documentation Feedback

We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. You can send your comments to **techpubs-comments@juniper.net**, or fill out the documentation feedback form at https://www.juniper.net/cgi-bin/docbugreport/ . If you are using e-mail, be sure to include the following information with your comments:

- Document or topic name
- URL or page number
- Software release version (if applicable)

Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active J-Care or JNASC support contract,

or are covered under warranty, and need post-sales technical support, you can access our tools and resources online or open a case with JTAC.

- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the *JTAC User Guide* located at http://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf .
- Product warranties—For product warranty information, visit http://www.juniper.net/support/warranty/ .
- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

Self-Help Online Tools and Resources

For quick and easy problem resolution, Juniper Networks has designed an online self-service portal called the Customer Support Center (CSC) that provides you with the following features:

- Find CSC offerings: http://www.juniper.net/customers/support/
- Search for known bugs: http://www2.juniper.net/kb/
- Find product documentation: http://www.juniper.net/techpubs/
- Find solutions and answer questions using our Knowledge Base: http://kb.juniper.net/
- Download the latest versions of software and review release notes: http://www.juniper.net/customers/csc/software/
- Search technical bulletins for relevant hardware and software notifications: https://www.juniper.net/alerts/
- Join and participate in the Juniper Networks Community Forum: http://www.juniper.net/company/communities/
- Open a case online in the CSC Case Management tool: http://www.juniper.net/cm/

To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool: https://tools.juniper.net/SerialNumberEntitlementSearch/

Opening a Case with JTAC

You can open a case with JTAC on the Web or by telephone.

- Use the Case Management tool in the CSC at http://www.juniper.net/cm/ .
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

For international or direct-dial options in countries without toll-free numbers, see http://www.juniper.net/support/requesting-support.html .

PART 1

Overview

CHAPTER 1

DHCP Overview

DHCP Overview

The Dynamic Host Configuration Protocol (DHCP) is an automatic configuration protocol on IP networks, which eliminates the need for intervention by a network administrator. Networks and systems connected to IP networks must be configured before they can communicate with other computers on the network. DHCP maintains a database that helps to track computers that have been connected to the network and this prevents two computers from accidentally being configured with the same IP address.

The IP address is the most important configuration parameter of the DHCP. A computer must be initially assigned a specific IP address that is appropriate to the network to which the computer is attached and that is not assigned to any other computer on that network. If you move a computer to a new network, it must be assigned a new IP address for that new network. You can use the DHCP to manage these assignments automatically.

An IP client contacts a DHCP server for configuration parameters. The DHCP server is typically centrally located and operated by the network administrator. The server is run by a network administrator so that DHCP clients can be reliably and dynamically configured with parameters appropriate to the current network architecture.

You can configure the MX router to support the following DHCP features:

- DHCP Configuration under APN Configuration
- DHCP Profile Configuration

DHCP Protocol

The DHCP is based on a bootstrap protocol (BOOTP) that provides clients the means to allot their own IP address, the IP address of a server host, and the name of a bootstrap file. DHCP servers can serve requests from BOOTP clients and provide additional capabilities beyond BOOTP, such as the automatic allocation of reusable IP addresses and additional configuration options.

DHCP provides two primary functions:

- Allocating temporary or permanent IP addresses to clients
- Storing, managing, and providing client configuration parameters

DHCP Proxy Client

In regular DHCP client configuration, the client and server are on the same subnet. The client makes a request to the server for an IP address and other configuration items and associates them with the local host interface. This may happen at boot time or at renewal time or at interface initialization. In a DHCP proxy configuration, the client and server are on different subnets. The proxy intercepts the request from the client and mimics the server. It forwards the request from the client to the server and informs the server of the subnet from which the client is requesting an IP address. The server responds with the IP address and other attributes, which are forwarded to the client via the proxy. In a DHCP proxy client, the subscriber manager requests the DHCP server for an IP address and other configurations on behalf of the subscriber. The proxy hides the server details by acting as the server from the view of the subscriber, whereas the actual client uses the IP address and other configuration details. The server notices this proxy agent and communicates to the client like it would communicate with the normal proxy agent in the network.

PART 2

Configuration

CHAPTER 2

Configuration Tasks

Configuring DHCP Proxy Client

To configure a DHCPv4 or a DHCPv6 profile, configure the DHCP proxy client on the system services for the routing instance. Use the following procedure to set up a DHCPv4 profile. Use the same procedure to set up a DHCPv6 profile.

To configure a DHCPv4 profile on the system services for a routing instance on an MX router.

1. Configure the bind interfaces for the DHCPv4 profile. For a DHCPv4 proxy client, the interface must be configured with the valid **inet** address and **inet** address family. Similarly, for the DHCPv6 profile, the interface must be configured with the valid **inet6** address and **inet6** family.

   [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]
   user@host# **set bind-interfaces** *interface-name ip-address*

2. Configure the dead server retry interval for the DHCPv4 profile. The range for the number of seconds before reconnecting to a dead server, which was marked down in previous attempts, is from 300 through 3600.

   [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]
   user@host# **set dead-server-retry-interval** *n*

3. Configure the dead server successive retry attempt for the DHCPv4 profile. The range for the number of successive retry attempts before declaring an unresponsive server dead is from 5 through 1000.

   [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]
   user@host# **set dead-server-successive-retry-attempt** *n*

4. Configure the DHCP server selection algorithm for the DHCPv4 profile. The DHCP server is selected either by the highest priority or round-robin method, according to the option specified for server selection.

   [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]
   user@host# **set dhcp-server-selection-algorithm [highest-priority-server | round-robin]**

5. Configure the lease time for the DHCPv4 profile. The range for the minimum and maximum allowable lease times that are accepted in responses from DHCP servers is from 60 through 1000.

   [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]
   user@host# **set lease-time** *n*

6. Configure the pool name for the DHCPv4 profile. The pool name is sent to the server only if it is configured and is optional.

   [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]
   user@host# **set pool-name** *string*

7. Configure the retransmission attempt for the DHCPv4 profile. The range for the maximum number of times that the system attempts to communicate with the unresponsive DHCP server before it is considered a failure is from 0 through 1000.

   [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]
   user@host# **set retransmission-attempt** *n*

8. Configure the retransmission interval for the DHCP4 profile. The range for the amount of time that must pass with no response before the system reattempts to communicate with the DHCP server is from 4 through 64.

   [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]
   user@host# **set retransmission-interval** *n*

9. Configure the servers for the DHCPv4 profile. This is applicable only to DHCPv4 and a minimum of one server must be configured for effective communication between the DHCP proxy clients and the DHCP server.

   [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]
   user@host# **set servers** *ip-v4address* **priority;**

Configuring DHCP Under APN

To configure a DHCPv4-proxy-client-profile or a DHCPv6-proxy-client-profile, configure the address assignment on the APN services for **unified-edge gateways ggsn-pgw**. Use the following configuration to set up a DHCPv4-proxy client profile. Use the same procedures to set up a DHCPv6-proxy client profile.

To configure a DHCPv4 profile on the system services for a routing instance on an MX router:

1. Configure the DHCPv4 proxy client profile.

   [edit unified-edge gateways ggsn-pgw *name* apn-services apn *name*
   address-assignment]
   user@host# **set dhcpv4-proxy-client-profile logical-system** *ls* **routing-instance** *ri*
   profile-name *dhcpv4-prof-namename-of-pool-to-send-to-dhcp-server*

CHAPTER 3

Configuration Statements

[edit routing-instance system] Hierarchy Level

```
services {
  dhcp-proxy-client {
    dhcpv4-profiles profile-name {
      bind-interface interface-name;
      dead-server-retry-interval interval-in-seconds;
      dead-server-successive-retry-attempt number-of-attempts;
      dhcp-server-selection-algorithm (highest-priority-server | round-robin);
      lease-time time-in-seconds;
      pool-name pool-name;
      retransmission-attempt  number-of-attempts;
      retransmission-interval interval-in-seconds;
      servers ip-address {
        priority value;
      }
    }
    dhcpv6-profiles profile-name {
      bind-interface interface-name;
      lease-time time-in-seconds;
      pool-name pool-name;
      retransmission-attempt  number-of-attempts;
      retransmission-interval interval-in-seconds;
    }
    traceoptions {
      file {
        filename;
        files files;
        match match;
        (no-world-readable | world-readable);
        size size;
      }
      flag {
        flag;
      }
      no-remote-trace;
    }
}
```

Related Documentation
- Notational Conventions Used in Junos OS Configuration Hierarchies

[edit access address-assignment] Hierarchy Level

```
address-assignment {
  mobile-pool-groups {
    group-name {
      [pool-name];
    }
  }
  mobile-pools {
    name {
      ageing-window ageing-window;
      default-pool;
      family (inet | inet6) {
        network {
          [network-prefix] {
            allocation-prefix-length allocation-prefix-length;
            external-assigned;
            range {
              [name] {
                external-assigned;
                high high;
                low low;
              }
            }
          }
        }
      }
      pool-prefetch-threshold  pool-prefetch-threshold;
      pool-snmp-trap-threshold pool-snmp-trap-threshold;
      service-mode service-mode-options;
    }
  }
}
```

Related Documentation
- Notational Conventions Used in Junos OS Configuration Hierarchies

address-assignment (MobileNext Broadband Gateway)

Syntax

```
address-assignment {
  mobile-pool-groups {
    group-name {
      [pool-name];
    }
  }
  mobile-pools {
    name {
      ageing-window ageing-window;
      default-pool;
      family (inet | inet6) {
        network {
          [network-prefix] {
            allocation-prefix-length allocation-prefix-length;
            external-assigned;
            range {
              [name] {
                external-assigned;
                high high;
                low low;
              }
            }
          }
        }
      }
      pool-prefetch-threshold  pool-prefetch-threshold;
      pool-snmp-trap-threshold pool-snmp-trap-threshold;
      service-mode service-mode-options;
    }
  }
}
```

Hierarchy Level

[edit access],
[edit routing-instances *instance-name* access]

Release Information

Statement introduced in Junos OS Mobility Release 11.2W.

Description

Configure the mobile pools and mobile pool groups that are used by the broadband gateway to assign addresses to subscribers. You can configure both IPv4 and IPv6 mobile pools and mobile pool groups.

The remaining statements are explained separately.

Required Privilege Level

access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

Related Documentation

- [edit access address-assignment] Hierarchy Level on page 10
- Example: Simple Unified Edge Configuration

ageing-window (Mobile Pools)

Syntax ageing-window *ageing-window*;

Hierarchy Level [edit access address-assignment mobile-pools *name*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name*]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description Specify the time up to which IP addresses from the configured mobile pools should not be reused. Addresses from deleted packet data protocol (PDP) contexts or bearers are not reused by the broadband gateway until the time specified.

Default If you do not configure a value, then the default is used.

Options ***ageing-window***—Time, in seconds, up to which addresses should not be reused.

Range: 1 through 65,535 seconds

Default: 2 seconds

Required Privilege Level access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

Related Documentation

- mobile-pools on page 27

allocation-prefix-length (Mobile Pools)

Syntax allocation-prefix-length *allocation-prefix-length*;

Hierarchy Level [edit access address-assignment mobile-pools *name* family inet network *network-prefix*],
[edit access address-assignment mobile-pools *name* family inet6 network *network-prefix*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name* family inet network *network-prefix*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name* family inet6 network *network-prefix*]

Release Information Statement introduced in Junos OS Mobility Release 11.4W.

Description Configure the prefix length for address allocation in mobile pools. The allocation prefix length determines the size of the address allocation block (or chunk) assigned to each session PIC on the broadband gateway.

The default configuration for mobile pools is to assign 1024 addresses (prefix length 22 for IPv4 and 118 for IPv6) in each address allocation block. When the mobile pools are relatively small, the default configuration may not allow for all session PICs to be assigned an address block from which to allocate IP addresses. The prefix length specified using the **allocation-prefix-length** statement overrides the default prefix length. If the configured prefix length is smaller than the default prefix length, then this increases the chances that all session PICs are allocated an address block.

NOTE: If you configure this statement, then you cannot configure the external-assigned statement.

Options ***allocation-prefix-length***—Prefix length for the address allocation.

Range:

- 32 (1 address) to 22 (1024 addresses) for IPv4 addresses
- 64 (1 address) to 54 (1024 addresses) for IPv6 addresses

Default:

- 22 (1024 addresses) for IPv4 addresses
- 54 (1024 addresses) for IPv6 addresses

Required Privilege Level access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

Related Documentation

- network (Mobile Pools) on page 28

bind-interface

Syntax bind-interface *interface-name*;

Hierarchy Level [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*],
[edit routing-instances *name* system services dhcp-proxy-client dhcpv6-profiles *name*]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description Specify the interface on which the DHCP proxy client communicates with the configured DHCP servers. The primary IPv4 address of the bind interface is the source of DHCP packets for DHCPv4 and the source interface of DHCP control packets for DHCPv6.

For the DHCPv4 proxy client, the interface specified here must be previously configured with the valid **inet** address and **inet address** family. Similarly, for the DHCPv6 proxy client, the interface must be previously configured with the valid **inet6** address and **inet6** family. The interface specified here is configured at the **[edit interfaces]** hierarchy level.

NOTE: You must configure the bind-interface for a DHCPv4 proxy client profile and a DHCPv6 proxy client profile.

Example 1: Configuring dhcp-proxy-client with interfaces.

```
ge-0/1/5 {
description "Interface facing DHCP server side";
unit 0 {
 family inet {
  address 10.1.1.1/24;
   }
  }
 }
```

Example 2: Configuring dhcp-proxy-client v4 profile

```
services {
 dhcp-proxy-client {
  dhcpv4-profiles dhcp-prof-1 {
   bind-interface ge-0/1/5.0;
   servers 10.1.1.2;
   }
  }
 }
```

Options *interface-name*—Name of the previously configured interface.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- DHCP Overview on page 3
- dhcpv4-profiles on page 21
- dhcpv6-profiles on page 22

dead-server-retry-interval

Syntax dead-server-retry-interval *interval-in-seconds*;

Hierarchy Level [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description Configure the number of seconds before the broadband gateway reconnects with a dead server that was marked down in previous attempts. A server is marked down if there is no response for multiple successive attempts. The number of attempts can be configured using the **dead-server-successive-retry-attempt** statement.

Options ***interval-in-seconds***—Interval, in seconds, between retries.

Range: 300 through 3600 seconds

Default: 300 seconds

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- dead-server-successive-retry-attempt on page 16
- DHCP Overview on page 3
- dhcpv4-profiles on page 21

dead-server-successive-retry-attempt

Syntax dead-server-successive-retry-attempt *number-of-attempts*;

Hierarchy Level [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description Specify the number of successive retry attempts that the broadband gateway makes to contact a server before declaring an unresponsive server dead. If a server is marked dead, no DHCP packets are sent to the server until the dead timer, specified using the **dead-server-retry-interval** statement, elapses and the server comes alive.

Options ***number-of-attempts***—Number of successive attempts between retries.

Range: 5 through 1000

Default: 10

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- dead-server-retry-interval on page 15
- DHCP Overview on page 3
- dhcpv4-profiles on page 21

default-pool (Mobile Pools)

Syntax default-pool;

Hierarchy Level [edit access address-assignment mobile-pools *name*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name*]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description Configure the mobile pool as a default pool. The broadband gateway uses the default pool to assign IP addresses to subscribers when a mobile pool or mobile pool group is not explicitly specified in the address assignment configuration for the access point name (APN).

Required Privilege Level access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

Related Documentation

- address-assignment (APN)
- mobile-pools on page 27

dhcp

Syntax

```
system {
  services {
    dhcp-proxy-client
      dhcpv4-profiles {
        dhcpv4-client-profile-name-1 {
          bind-interface interface-name [ip-address];
          dead-server-retry-intervaln secs
          dead-server-successive-retry-attempt n times
          dhcp-server-selection-algorithm [ highest-priority-server | round-robin ]
          lease-timen secs
          pool-namestrings
          retransmission-attemptn times
          retransmission-intervaln secs
          servers {
            ipv4-address priority1 to 5
          }
        }
      }
        dhcpv6-profiles {
          dhcpv6-client-profile-name-1 {
            bind-interface interface-name [ip-address];
            dead-server-retry-intervaln secs
            dead-server-successive-retry-attempt n times
            dhcp-server-selection-algorithm [ highest-priority-server | round-robin ]
            lease-timen secs
            pool-namestrings
            retransmission-attemptn times
            retransmission-intervaln secs
            servers {
              ipv6-address priority 1 to 5
            }
          }
        }
        traceoptions {
          file ;
          flag ;
        }
  }
}
```

Hierarchy Level [edit routing-instances]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description The Dynamic Host Configuration Protocol (DHCP) is an automatic configuration protocol on IP networks eliminating the need for intervention by a network administrator. The most important configuration parameter carried by DHCP is the IP address. A computer must be initially assigned a specific IP address that is appropriate to the network to which the computer is attached and that is not assigned to any other computer on that network.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- DHCP Overview on page 3

dhcp-proxy-client

Syntax

```
dhcp-proxy-client {
  dhcpv4-profiles profile-name {
    bind-interface interface-name;
    dead-server-retry-interval interval-in-seconds;
    dead-server-successive-retry-attempt number-of-attempts;
    dhcp-server-selection-algorithm (highest-priority-server | round-robin);
    lease-time time-in-seconds;
    pool-name pool-name;
    retransmission-attempt  number-of-attempts;
    retransmission-interval interval-in-seconds;
    servers ip-address {
      priority value;
    }
  }
  dhcpv6-profiles profile-name {
    bind-interface interface-name;
    lease-time time-in-seconds;
    pool-name pool-name;
    retransmission-attempt  number-of-attempts;
    retransmission-interval interval-in-seconds;
  }
  traceoptions {
    file {
      filename;
      files files;
      match match;
      (no-world-readable | world-readable);
      size size;
    }
    flag {
      flag;
    }
    no-remote-trace;
  }
}
```

Hierarchy Level [edit routing-instances *name* system services]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description Configure the Dynamic Host Configuration Protocol (DHCP) proxy client parameters to enable DHCP-based IPv4 or IPv6 address allocation for mobile subscribers.

The DHCP proxy client acquires a subnet (IPv4) or a prefix (IPv6) from the server as per DHCP IETF specifications. After the subnet or prefix is obtained from the server, the DHCP proxy client is managed locally for the mobile subscriber. When all mobile subscribers using the addresses in the subnet or prefix are detached from the GGSN or P-GW, the acquired subnet or prefix is released and the prefix or subnet can be assigned to another GGSN or P-GW by the DHCP server.

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- DHCP Overview on page 3
- services (DHCP Proxy Client) on page 36

dhcp-server-selection-algorithm

Syntax dhcp-server-selection-algoritm (highest-priority-server | round-robin);

Hierarchy Level [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description Specify the algorithm used to select the DHCP server with which to communicate when multiple servers are configured. The DHCP server is selected either by the highest priority or by round-robin method, according to the algorithm specified for server selection.

Default If you do not include this statement, the **round-robin** algorithm is used.

Options ***round-robin***—Server is selected in a fixed cyclical order.

highest-priority-server—Server with the highest priority is selected. (The server priority is configured using the **priority** statement at the **[edit routing-instances name system services dhcp-proxy-client dhcpv4-profiles name servers address]** hierarchy level.)

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- DHCP Overview on page 3
- dhcpv4-profiles on page 21
- priority (DHCP Server) on page 31

dhcpv4-profiles

Syntax

```
dhcpv4-profiles profile-name {
  bind-interface interface-name;
  dead-server-retry-interval interval-in-seconds;
  dead-server-successive-retry-attempt number-of-attempts;
  dhcp-server-selection-algorithm (highest-priority-server | round-robin);
  lease-time time-in-seconds;
  pool-name pool-name;
  retransmission-attempt  number-of-attempts;
  retransmission-interval interval-in-seconds;
  servers ip-address {
    priority value;
  }
}
```

Hierarchy Level [edit routing-instances *name* system dhcp-proxy-client]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description Configure DHCPv4 proxy client profiles. The access point name (APN) refers to the DHCPv4 profiles to obtain the subnet from the DHCP server.

NOTE: The DHCPv4 profile referenced by the APN is configured using the **profile-name** statement at the [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment dhcpv4-proxy-client-profile] hierarchy level.

A single DHCPv4 profile can be referenced by one or more APNs; alternatively, each APN can be configured to use a different DHCPv4 profile.

Options ***profile-name***—Name of the DHCPv4 proxy client profile.

Range: Up to 63 characters

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- DHCP Overview on page 3
- dhcp-proxy-client on page 19
- profile-name (APN Address Assignment)

dhcpv6-profiles

Syntax

```
dhcpv6-profiles profile-name {
  bind-interface interface-name;
  lease-time time-in-seconds;
  pool-name pool-name;
  retransmission-attempt number-of-attempts;
  retransmission-interval interval-in-seconds;
}
```

Hierarchy Level [edit routing-instances *name* system dhcp-proxy-client]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description Configure DHCPv6 proxy client profiles. The access point name (APN) refers to the DHCPv6 profiles to obtain the prefix from the DHCP server.

NOTE: The DHCPv6 profile referenced by the APN is configured using the **profile-name** statement at the [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment dhcpv6-proxy-client-profile] hierarchy level.

A single DHCPv6 profile can be referenced by one or more APNs; alternatively, each APN can be configured to use a different DHCPv6 profile.

Options ***profile-name***—Name of the DHCPv6 proxy client profile.

Range: Up to 63 characters

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- DHCP Overview on page 3
- dhcp-proxy-client on page 19
- profile-name (APN Address Assignment)

external-assigned (Mobile Pools)

Syntax external-assigned;

Hierarchy Level
[edit access address-assignment mobile-pools *name* family inet network *network-prefix*],
[edit access address-assignment mobile-pools *name* family inet6 network *network-prefix*],
[edit access address-assignment mobile-pools *name* family inet network *network-prefix* range *name*],
[edit access address-assignment mobile-pools *name* family inet6 network *network-prefix* range *name*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name* family inet network *network-prefix*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name* family inet6 network *network-prefix*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name* family inet network *network-prefix* range *name*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name* family inet6 network *network-prefix* range *name*]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description Specify that the addresses in the associated network prefix or range are assigned by an external authority—for example, by the authentication, authorization, and accounting (AAA) server or statically by the user equipment. You can specify this either for the network prefix or for a range under the network prefix.

NOTE: If you configure this statement, then you cannot configure the **allocation-prefix-length** statement.

Required Privilege Level access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

Related Documentation
- network (Mobile Pools) on page 28
- range (Mobile Pools) on page 32

lease-time (DHCP Proxy Client Profile)

Syntax lease-time *time-in-seconds*;

Hierarchy Level [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*],
[edit routing-instances *name* system services dhcp-proxy-client dhcpv6-profiles *name*]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description Configure the default lease time, in seconds. If the DHCP client does not get the lease time from the DHCP server, it uses the configured default lease time as the lease time.

The lease time indicates the time for which the broadband gateway holds the DHCP subnets or prefixes, if the server does not respond to a renewal request. After the lease time elapses, the subnets or prefixes are removed from the gateway and the subscriber is deleted.

Default If the DHCP client does not get the lease time from DHCP server, and if the default lease time is not configured (using this statement), then the gateway holds on to the subnets or prefixes as long as the subscribers, whose addresses are allocated from the subnets or prefixes, are active. The gateway does not renew the subnets or prefixes until the DHCP server sends a FORCE RENEW message.

Options ***time-in-seconds***—Number of seconds the lease can be held.

Range: 60 through 1000 seconds

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- DHCP Overview on page 3
- dhcpv4-profiles on page 21
- dhcpv6-profiles on page 22

family (Mobile Pools)

Syntax

```
family (inet | inet6) {
  network {
    [network-prefix] {
      allocation-prefix-length allocation-prefix-length;
      external-assigned;
      range {
        [name] {
          external-assigned;
          high high;
          low low;
        }
      }
    }
  }
}
```

Hierarchy Level [edit access address-assignment mobile-pools *name*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name*]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description Specify the protocol family information for the mobile pool. Mobile pools must have either **inet** (IPv4) or **inet6** (IPv6) configured.

NOTE: A mobile pool can have either inet (IPv4) or inet6 (IPv6) configured but not both.

Options **inet**—IP version 4 (IPv4).

inet6—IP version 6 (IPv6).

The remaining statements are explained separately.

Required Privilege Level access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

Related Documentation

- mobile-pools on page 27

mobile-pool-groups

Syntax

```
mobile-pool-groups {
  group-name {
    [pool-name];
  }
}
```

Hierarchy Level [edit access address-assignment],
[edit routing-instances *instance-name* access address-assignment]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description Configure the mobile pool groups that are used by the broadband gateway to assign addresses to subscribers. You can configure both IPv4 and IPv6 pool groups.

Mobile pool groups are a collection of one or more mobile pools. All the mobile pools in a mobile pool group should be of the same protocol family—**inet** or **inet6**. In addition, none of the mobile pools in a mobile pool group should be marked as a default.

Options ***group-name***—Name of the mobile pool group.

Range: Up to 63 characters

pool-name—Name of the mobile pool. To specify multiple mobile pools, include the ***pool-name*** statement multiple times.

Range: Up to 63 characters

NOTE: The mobile pool that you specify must be previously configured on the broadband gateway in the same routing instance as the mobile pool group.

The remaining statements are explained separately.

Required Privilege Level access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

Related Documentation

- address-assignment (MobileNext Broadband Gateway) on page 11
- mobile-pools on page 27

mobile-pools

Syntax

```
mobile-pools {
  name {
    ageing-window ageing-window;
    default-pool;
    family (inet | inet6) {
      network {
        allocation-prefix-length allocation-prefix-length;
        [network-prefix] {
          external-assigned;
          range {
            [name] {
              external-assigned;
              high high;
              low low;
            }
          }
        }
      }
    }
    pool-prefetch-threshold  pool-prefetch-threshold;
    pool-snmp-trap-threshold pool-snmp-trap-threshold;
    service-mode service-mode-options;
  }
}
```

Hierarchy Level [edit access address-assignment],
[edit routing-instances *instance-name* access address-assignment]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description Configure the mobile pools that are used by the broadband gateway to assign addresses to subscribers. You can configure both IPv4 and IPv6 mobile pools and various other parameters related to address assignment.

Options *name*—Name of the mobile pool.

Range: Up to 63 characters

The remaining statements are explained separately.

Required Privilege Level access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

Related Documentation

- address-assignment (MobileNext Broadband Gateway) on page 11

network (Mobile Pools)

Syntax

```
network {
  [network-prefix] {
    allocation-prefix-length allocation-prefix-length;
    external-assigned;
    range {
      [name] {
        external-assigned;
        high high;
        low low;
      }
    }
  }
}
```

Hierarchy Level

[edit access address-assignment mobile-pools *name* family inet],
[edit access address-assignment mobile-pools *name* family inet6],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name* family inet],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name* family inet6]

Release Information

Statement introduced in Junos OS Mobility Release 11.2W.

Description

Specify the network prefix for the mobile pool for IPv4 or IPv6 addresses. The broadband gateway uses the network prefix to assign IP addresses to mobile subscribers. In addition, if an address range is configured under the network prefix, then addresses are allocated only from the specified range.

NOTE: **At least one network prefix must be configured.**

Options

network-prefix—Network prefix (IPv4 or IPv6).

The remaining statements are explained separately.

Required Privilege Level

access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

Related Documentation

- range (Mobile Pools) on page 32

pool-prefetch-threshold (Mobile Pools)

Syntax pool-prefetch-threshold *pool-prefetch-threshold*;

Hierarchy Level [edit access address-assignment mobile-pools *name*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name*]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description Specify the pool usage threshold in the mobile pool for pre-fetching addresses. The pre-fetch threshold is used when the pool is configured with prefixes, and when prefixes are added to an existing pool.

Default If you do not configure a value, then the default is used.

Options ***pool-prefetch-threshold***—Pre-fetch threshold percentage.

Range: 1 through 100

Default: 80

Required Privilege Level access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

Related Documentation

- mobile-pools on page 27

pool-snmp-trap-threshold (Mobile Pools)

Syntax pool-snmp-trap-threshold *pool-snmp-trap-threshold*;

Hierarchy Level [edit access address-assignment mobile-pools *name*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name*]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description Specify the pool usage threshold in the mobile pool for generating SNMP traps. When the percentage of addresses used in the mobile pool exceeds the specified threshold, a notification is sent indicating that the specified threshold has been crossed. After reaching the specified threshold, when the percentage of addresses used in the mobile pool drops 20 percent below the threshold, the notification indicating that the specified threshold was exceeded, is cleared.

Default If you do not configure a value, then the default is used.

Options ***pool-snmp-trap-threshold***—Threshold percentage.

Range: 1 through 100

Default: 80

Required Privilege Level access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

Related Documentation

- mobile-pools on page 27

priority (DHCP Server)

Syntax priority *priority*;

Hierarchy Level [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name* servers *address*]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description Configure the DHCP server priority. If the algorithm for server selection is based on the highest priority, then the broadband gateway uses the configured priority to select the active server with the highest priority. The DHCP Discover message is then sent to the selected server.

Options ***server-priority***—Priority for the DHCP server.

Default: 3

Range: 1 (highest priority) to 5 (lowest priority)

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- DHCP Overview on page 3
- dhcp-server-selection-algorithm on page 20
- servers (DHCP Proxy Client Profiles) on page 34

range (Mobile Pools)

Syntax

```
range {
  [name] {
    external-assigned;
    high high;
    low low;
  }
}
```

Hierarchy Level

[edit access address-assignment mobile-pools *name* family inet network *network-prefix*],
[edit access address-assignment mobile-pools *name* family inet6 network *network-prefix*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name* family inet network *network-prefix*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name* family inet6 network *network-prefix*]

Release Information

Statement introduced in Junos OS Mobility Release 11.2W.

Description

Specify the address ranges within the network prefix of the mobile pool. This configuration is optional. If a range is specified, then the broadband gateway assigns addresses only from the specified range.

Options

high *high*—Upper address (IPv4) or prefix (IPv6) of the range.

low *low*—Lower address (IPv4) or prefix (IPv6) of the range.

NOTE: If you specify a range, then the high and low statements are mandatory.

name—Name of the address range.

Range: Up to 63 characters

Syntax: The name must be unique within a mobile pool.

The remaining statement is explained separately.

Required Privilege Level

access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

Related Documentation

- network (Mobile Pools) on page 28

retransmission-attempt (DHCP Proxy Client Profiles)

Syntax retransmission-attempt *number-of-attempts*;

Hierarchy Level [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*],
[edit routing-instances *name* system services dhcp-proxy-client dhcpv6-profiles *name*]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description Configure the maximum number of times that the system attempts to communicate with the unresponsive DHCP server before each subnet allocation request is deemed as failed.

Options ***number***—Number of attempts to retransmit the packet.

Range: 0 through 1000

Default: 4

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- DHCP Overview on page 3
- dhcpv4-profiles on page 21
- dhcpv6-profiles on page 22

retransmission-interval (DHCP Proxy Client Profiles)

Syntax retransmission-interval *interval-in-seconds*;

Hierarchy Level [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*],
[edit routing-instances *name* system services dhcp-proxy-client dhcpv6-profiles *name*]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description Configure the amount of time that must pass with no response before the system reattempts to communicate with the DHCP server.

Options ***interval-in-seconds***—Number of seconds between successive retransmissions.

Range: 4 through 64

Default: 4

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- DHCP Overview on page 3
- dhcpv4-profiles on page 21
- dhcpv6-profiles on page 22

servers (DHCP Proxy Client Profiles)

Syntax

```
servers ip-address {
    priority value;
}
```

Hierarchy Level [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description Configure the list of DHCP servers with which the DHCP proxy clients communicate to obtain the IPv4 subnet , which is used to allocate IP addresses to mobile subscribers on the broadband gateway.

This configuration is applicable only to DHCPv4 profiles. You must configure at least one server.

Options **ip-address**—IPv4 address of the server.

The remaining statement is explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- DHCP Overview on page 3
- dhcpv4-profiles on page 21

service-mode (Mobile Pools)

Syntax service-mode *service-mode-options*;

Hierarchy Level [edit access address-assignment mobile-pools *name*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name*]

Description Specify that the mobile pool should be in **maintenance** mode. You do this if you want to carry out maintenance tasks like deleting or modifying a mobile pool and so on. See the *Maintenance Mode* chapter in the *MobileNext Broadband Gateway Configuration Guide* for a list of the maintenance tasks that can be carried out when the mobile pool is in maintenance mode.

When in the **Maintenance Mode Active Phase**, all the valid attributes on the object can be modified. In other cases, only the non-maintenance mode attributes can be modified.

Options ***service-mode-options***—Specify the service mode. Currently, **maintenance** mode is the only option supported.

Required Privilege Level access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

Related Documentation

- Changing Address Attributes in the Mobile Address Pool
- Deleting a Mobile Address Pool
- mobile-pools on page 27

services (DHCP Proxy Client)

Syntax

```
services {
  dhcp-proxy-client {
    dhcpv4-profiles profile-name {
      bind-interface interface-name;
      dead-server-retry-interval interval-in-seconds;
      dead-server-successive-retry-attempt number-of-attempts;
      dhcp-server-selection-algorithm (highest-priority-server | round-robin);
      lease-time time-in-seconds;
      pool-name pool-name;
      retransmission-attempt  number-of-attempts;
      retransmission-interval interval-in-seconds;
      servers ip-address {
        priority value;
      }
    }
    dhcpv6-profiles profile-name {
      bind-interface interface-name;
      lease-time time-in-seconds;
      pool-name pool-name;
      retransmission-attempt  number-of-attempts;
      retransmission-interval interval-in-seconds;
    }
    traceoptions {
      file {
        filename;
        files files;
        match match;
        (no-world-readable | world-readable);
        size size;
      }
      flag {
        flag;
      }
      no-remote-trace;
    }
}
```

Hierarchy Level [edit routing-instances *name* system]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description Configure the DHCPv4 and DHCPv6 proxy client profiles.

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- DHCP Overview on page 3
- system (DHCP Proxy Client) on page 37

system (DHCP Proxy Client)

Syntax

```
system {
  services {
    dhcp-proxy-client {
      dhcpv4-profiles profile-name {
        bind-interface interface-name;
        dead-server-retry-interval interval-in-seconds;
        dead-server-successive-retry-attempt number-of-attempts;
        dhcp-server-selection-algorithm (highest-priority-server | round-robin);
        lease-time time-in-seconds;
        pool-name pool-name;
        retransmission-attempt  number-of-attempts;
        retransmission-interval interval-in-seconds;
        servers ip-address {
          priority value;
        }
      }
      dhcpv6-profiles profile-name {
        bind-interface interface-name;
        lease-time time-in-seconds;
        pool-name pool-name;
        retransmission-attempt  number-of-attempts;
        retransmission-interval interval-in-seconds;
      }
      traceoptions {
        file {
          filename;
          files files;
          match match;
          (no-world-readable | world-readable);
          size size;
        }
        flag {
          flag;
        }
        no-remote-trace;
      }
    }
  }
```

Hierarchy Level [edit routing-instances]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description Configure the DHCPv4 and DHCPv6 proxy client profiles.

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- [edit routing-instance system] Hierarchy Level on page 9
- DHCP Overview on page 3

traceoptions (DHCP Proxy Client)

Syntax

```
traceoptions {
  file {
    filename;
    files files;
    match match;
    (no-world-readable | world-readable);
    size size;
  }
  flag {
    flag;
  }
  no-remote-trace;
}
```

Hierarchy Level [edit routing-instances *name* system services dhcp-proxy-client]

Release Information Statement introduced in Junos OS Mobility Release 11.2W.

Description Define global tracing operations for DHCP proxy client.

Options ***filename***—Name of the file that receives the output of the tracing operation. All files are placed in the **/var/log** directory.

files *files*—(Optional) Maximum number of trace files. When a trace file named **trace-file** reaches its maximum size, it is renamed **trace-file.0**, then **trace-file.1**, and so on, until the maximum number of trace files is reached. Then, the oldest trace file is overwritten.

If you specify a maximum number of files, you must also specify a maximum file size with the **size** option and a filename.

Range: 2 through 1000

Default: 3 files

flag

- *flag*—You can use one of the following flags:
  - **all**—Trace all operations.
  - **auth**—Trace authentication operations.
  - **database**—Trace database operations.
  - **fwd**—Trace firewall process operations.
  - **general**—Trace miscellaneous opertions.
  - **ha**—Trace operations related to high availability.
  - **interface**—Trace interface operations.

- **io**—Trace I/O operations.
- **packet**—Trace packet decoding operations.
- **performance**—Trace performance measurement operations.
- **profile**—Trace profile operations.
- **rpd**—Trace routing protocol process operations.
- **rtsock**—Trace routing socket operations.
- **session-db**—Trace session database operations.
- **state**—Trace state transition operations.
- **statistics**—Trace statistics operations.
- **ui**—Trace user interface operations.

match *match*—(Optional) Refine the output to include lines that contain the regular expression.

no-remote-trace—(Optional) Disable remote tracing.

no-world-readable—(Optional) Restrict access to the originator of the trace operation only.

size *size*—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). If you specify a maximum file size, you must also specify a maximum number of trace files with the **files** option and filename.

Syntax: **xk** to specify KB, **xm** to specify MB, or **xg** to specify GB

Range: 10 KB through 1 GB

Default: 128 KB

world-readable—(Optional) Enable unrestricted file access.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- DHCP Overview on page 3
- dhcp-proxy-client on page 19

PART 3

Index

Index

R

S

T