RADVISION

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viaIP Dial Plan

Handbook

NOTICE

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CONTENTS

INTRODUCTION TO THE DIAL PLAN

WHAT'S INSIDE

This document describes the viaIP Dial Plan and includes the following:

- Introduction to the viaIP Dial Plan.
- Network criteria that affect the design of a dial plan.
- viaIP configuration tools for customizing a dial plan to suit your organizational requirements.

OVERVIEW

In traditional telephony systems, a dial plan is a front end system that allows users to call each other by dialing a number on a telephone. In voice and video conferencing over IP, a dial plan is a system that allows participants in point-to-point or multipoint conferences to call each other or join conferences. Participants type or dial a string of digits or characters at their terminal or IP phone.

The viaIP Dial Plan provides "configuration tools" which allows network administrators to build an IP dial plan that suits the requirements of their organization and network. These tools enable you to:

- Configure gatekeepers in a flat and/or hierarchical topology to enable efficient location of called endpoints.
- Assign extension numbers or aliases to endpoints.
- Configure gateways, MCUs and gatekeepers to support services.
- Assign prefixes to facilitate dialing within and between zones in the IP network, and dialing to and from PSTN networks.

The viaIP ECS, viaIP mcu-xx (Multipoint Conference Unit) and viaIP gw-xx (Gateway) support the viaIP Dial Plan and work in a unified way to create an integrated dial plan. The viaIP ECS is at the heart of the dial plan.

The viaIP Dial Plan is scalable. Because it allows an hierarchical architecture, you can start a network with a single zone (one gatekeeper) and a small number of endpoints and scale up the dial plan as the network grows.

The viaIP Dial Plan is suitable for both Service Provider and enterprise requirements. The hierarchical architecture facilitates the setting up of enterprise networks, large Service Provider deployments and dialing structures that support national and international dialing.

The viaIP ECS version 2 and up is backward compatible with the dial plan of viaIP ECS version 1. You can configure the ECS to use the version 1 dial plan or the version 2 dial plan. This document describes the version 2 dial plan and is referred to as the viaIP Dial Plan.

UNDERSTANDING YOUR NETWORK

There are a number of criteria that you should consider before defining a dial plan. These include network size, whether dialing is internal or external or both, scalability, whether you want PSTN numbering or alias numbering, and whether you wish to create a PBX-like environment. A further consideration is the relative positioning of gatekeepers within the network.

WHAT KIND OF NETWORK DO YOU HAVE?

The kind of network you have will determine the kind of viaIP Dial Plan you will build. The following criteria will help you understand what kind of network you have:

- **Network Scale**

  Network scale is a key factor when deciding about the type of viaIP Dial Plan you will build. If the network is large, setting up and configuring an hierarchy of gatekeepers is recommended. If the network is small, a simple, flat topology may be sufficient.

- **Network Usage**

  The way your network will be used will affect the dial plan. If the network will be used for internal as well as external calls, the viaIP Dial Plan should include a way to dial out from the inside network to the outside network. If the network will be used for internal calls only, aliases or simple four- or five-digit numbers may be preferable to longer PSTN-like numbers.

- **Expected Network Growth**

  Scalability is an important issue. Setting up and configuring devices in the network is time-consuming. When a network grows and new endpoints, dialing areas and gatekeepers are added there may be a need to renumber the entire system. It is recommended to plan for growth when designing the dial pan.

- **Network Device Population**

  Network population affects the dial plan. It is worthwhile verifying what devices populate the network. Are there only terminals? Are there other devices such as gateways and MCUs? How many gatekeepers do you require?

- **Network Organization**

  If there are gatekeepers and gateways, check whether they are in the same NOC. Find where POPs are located and where they are dispersed through the network. It is useful to place an ECS at each POP.

- **Services that the Network Provides**

  Services are a key factor in the viaIP Dial Plan. Analyze the types of services your network provides.

  Services can be local to a zone or they can be global. They can be centralized or decentralized. A service can be a gateway to one or many PSTN lines.

- **Types of Gatekeepers**

  It is important to understand the types of gatekeepers in the network. Are there only viaIP ECS gatekeepers or is there a mixture of ECS and non ECS gatekeepers? Are the ECS gatekeepers version 2 and above, so that they can support the viaIP Dial Plan?

GATEKEEPER TOPOLOGY

If you have more than one gatekeeper in the network, the way the gatekeepers are arranged in your network may affect the viaIP Dial Plan.

The criteria discussed in the previous section will help to determine the gatekeeper topology that best suits your requirements. You can arrange gatekeepers in an hierarchical or flat topology or a mixture of both.

FLAT TOPOLOGY (NEIGHBOR GATEKEEPERS)

A flat topology is created through the use of Neighbor Gatekeepers. In a small network or in a grouped part of the network, Neighbor Gatekeepers facilitate the quick location of destination endpoints.

EXAMPLE

1. Endpoint A is registered to ECS A. ECS A has been configured with Neighbor Gatekeeper.
2. Endpoint A dials to endpoint B.

3. ECS A searches its directory to see if endpoint B is in its zone.
4. If it is not ECS A sends an LRQ (Location Request) to one of its Neighbor Gatekeepers in an attempt to connect the call to endpoint B.

This method provides a fast and efficient way of locating endpoints.

A Neighbor Gatekeeper topology is suitable for a limited number of gatekeepers. If there are too many gatekeepers, then maintenance may be cumbersome. Each time a new gatekeeper "joins" the network each existing gatekeeper's Neighbor Gatekeeper list must be manually updated to include the new gatekeeper.

Learn More About It *For more information about Neighbor Gatekeepers, see the ECS Neighbors Tab and ECS Hierarchy Tab chapters in the viaIP ECS User Guide.*

Hierarchical Topology

An hierarchical topology consists of parent and child gatekeepers. The network can be regarded as a collection of groups of parents and children. Each gatekeeper knows its children, its parent and optionally, its neighbors.

Hierarchies are suitable for large networks and lend themselves to growth without requiring additional configuration of existing gatekeepers. When the network grows, all you need to do is add a new parent or child to the existing network.

In hierarchical topologies, endpoints typically register with the lowest-level gatekeeper (leaf). Exceptions to this generalization include endpoints that provide call-center services or endpoints that are gateways.

Learn More About It *For more information about hierarchies, see the ECS Hierarchy Tab chapter in the viaIP ECS User Guide.*

Mixed Topology

In larger networks, it usually makes sense to apply a mixed topology of neighbors and hierarchies. Neighbor Gatekeepers are useful when there is frequent inter-zone dialing. One or more gatekeepers can be grouped as Neighbor Gatekeepers within adjacent zones.

With Neighbor Gatekeepers, location of the destination endpoint and call routing are quicker than when LRQs are multicast or sent "upwards" in the hierarchy.

Note If one or more ECS gatekeepers have the same parent it does not necessarily imply that they are neighbors. A Neighbor Gatekeeper needs to be explicitly defined.

Criteria For Deciding The Type of Topology

The following guidelines may help you decide what type of topology best suits your network:

- Define the topology so that you don't need to change numbers even when the network scales.
- If your network is small and you don't anticipate much growth, use a Neighbor Gatekeeper and not a hierarchical topology.
- In an hierarchical topology, if endpoints in one zone dial frequently to endpoints in another zone define their gatekeepers as Neighbor Gatekeepers

Numbering

The next step in designing your Dial Plan is to decide on the type of numbering system you wish to apply. Some networks require dialing by means of aliases and others need to support PSTN numbering. When allocating numbers another factor to consider is the length or number of digits in the endpoint extension number.

You allocate endpoint numbers in the viaIP ECS by assigning aliases. An alias can be a phone number, URL address, transport address (IP address:port), name, e-mail address or party number.

Learn More About It *For more information about assigning numbers to endpoints, see the ECS Endpoints Tab chapter in the viaIP ECS User Guide.*

PSTN-Like Numbering

The viaIP Dial Plan has been designed so that users can dial PSTN (E.164) numbers. This means that when a user dials a number to request a service and/or to call another phone or terminal, the user does not need to be aware of the location of the dialed number. It is irrelevant whether the destination number is in an IP or PSTN network.

The advantages of endpoints registering with an ECS with a full PSTN-like number are:

- Endpoints in an organization support PSTN-like dialing.

- In an enterprise that uses an accounting system a PSTN-like number is useful for mixing internal accounting with PSTN billing.
- Service Provider billing is simplified as end-users can be clearly identified. Full numbers also facilitate integration of billing for different types of communication.

Aliases That Are Not Numbers

PSTN numbering may not be necessary or suitable for all environments. There are certain environments that may prefer a dial plan that uses URL or e-mail aliases instead of numbers. These types of environments are usually closed organizations or enterprises where there is no dialing out to PSTN.

Note If you prefer to use aliases instead of PSTN-like numbering then it is recommended to use the viaIP version 1 Dial Plan instead of the viaIP version 2 Dial Plan.

Learn More About It *For more information about selecting the version 1 Dial Plan, see the Basics section of the ECS Settings Tab chapter in the viaIP ECS User Guide.*

Number of Digits

The decision about the number of digits in the endpoint extension should take the current and future scale of your network into account.

If the network is small and there are currently less than 1000 endpoints, and you don't anticipate growth beyond 1000 endpoints, it is quite acceptable to give each endpoint a three-digit number. When the network grows beyond 1000 endpoints, you have to change all the numbers to four- or five-digit numbers, or you can establish new zones with endpoints registered with different gatekeepers.

Prefixes

Prefixes are characters or digits that are added to the dial strings to:

- Request a service.
- Provide zone information.
- Request out-of-zone dialing.

SERVICES

You request a service by dialing a prefix. The way the viaIP Dial Plan handles the request depends on the type of service. There are two types of services—global and local.

Learn More About It *For more information about services, see the ECS Settings Tab chapter in the viaIP ECS User Guide, the Services Tab section in the viaIP Multipoint Conferencing Unit [mcu-xx] User Guide, and About the Services Tab section in the viaIP Gateway [gw-P20] User Guide.*

GLOBAL SERVICES

A global service is a service that is available to everyone using the network. It is identified by a universal prefix. For example, a gateway service for dialing out to the PSTN may be global with a universal prefix such as “9”. All entities in the network recognize that the prefix “9” indicates that the call should be routed to the PSTN via a gateway.

In this case, the dial string would be:

Global Service Prefix-[Zone Prefix]-endpoint number

such as:

9-1201-5294300

or *9-5294300*

Learn More About It *For more information about global services, see the ECS Services Tab and the ENC Network Configurator chapters in the viaIP ECS User Guide.*

LOCAL SERVICES

A local service is local to a zone or to a part of the network. Its prefix may indicate different services in different parts of the network. For example, in one zone the service prefix for a video MCU conference may be “80” while in another zone “80” might indicate a voice-only MCU conference.

In this case, the dial string would be:

[Zone Prefix]-Local Service Prefix-endpoint number

such as:

1201-80-5645

or 80-5645

Learn More About It *For more information about local services, see the ECS Services Tab chapter in the viaIP ECS User Guide.*

ZONE PREFIXES

Endpoints that register to a gatekeeper are in a zone of that gatekeeper. You can define one or two zone prefixes for each viaIP ECS gatekeeper.

Gatekeepers identify their neighbors by their zone prefixes. viaIP ECS gatekeepers that have been configured with Neighbor Gatekeepers maintain lists of the zone prefixes of their Neighbor Gatekeepers.

The zone prefix can be used in the same way as an area code in regular telephony. This means that you can configure the viaIP Dial Plan so that an endpoint dialing to another endpoint in the same zone needs only to dial the endpoint extension number without dialing the zone prefix.

However, you can also configure the viaIP Dial Plan so that even in the same zone endpoints should dial the entire number.

Learn More About It *For more information about zone prefixes see, see the ECS Services Tab and the ENC Network Configurator chapters in the viaIP ECS User Guide.*

EXIT ZONE PREFIXES

Exit zone prefixes allow you to dial out of a zone. When a gatekeeper receives a dial string with an exit zone prefix, the gatekeeper handles the call as follows:

- If the ECS has no exit zone prefix it attempts to locate numbers within its zone.
- If the ECS has been configured with an exit zone prefix then when the ECS recognizes an exit zone prefix in the dialed string, the ECS routes the call out of the zone to a Neighbor Gatekeeper, parent or a child gatekeeper depending on the topology.

Learn More About It *For more information about zone prefixes see, see the ECS Services Tab and the ENC Network Configurator chapters in the viaIP ECS User Guide.*

STRIPPING

Stripping is a form of digit manipulation whereby a gatekeeper can be configured to strip (discard) certain digits from a dial string so that the dialed number will be recognized by the gatekeeper and routed to the right destination. Examples of stripping include:

- Exit zone stripping where the originating gatekeeper strips the exit zone prefix before routing the call.
- Self-zone stripping where the gatekeeper recognizes its own zone prefix and strips it before routing the call.

You can configure the ECS to strip or not strip prefixes depending on the circumstances. For example, you can configure the same ECS to strip (or not to strip) the zone prefix for LAN-to-LAN calls and to strip (or not strip) the zone prefix for LAN-to-WAN calls.

Learn More About It *For more information about stripping, see the Dial Plan section of the ECS Settings Tab chapter in the viaIP ECS User Guide.*

The following scenario demonstrates stripping:

In a national enterprise the topology of the network is hierarchical. The parent gatekeeper is located at Head Office. Each Branch Office has a gatekeeper registered as a child to the Head Office gatekeeper.

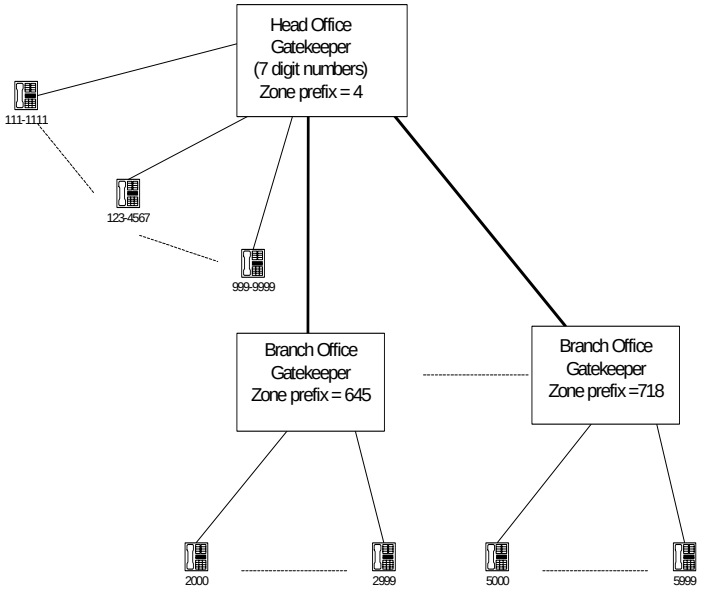

Figure 1 *Stripping*

Branch Office Configuration

The gatekeeper in Branch Office 645 has been configured as follows:

- Endpoints have numbers that contain four digits.
- Endpoints are registered with the Branch Office gatekeeper.
- The zone prefixes of the Branch Office gatekeepers are three-digit numbers such as 645.
- When endpoints dial within a Branch Office they dial four digits.
- Calls dialing into a Branch Office need to dial the zone prefix followed by the extension number. For example, 645-2000.
- The Local Office gatekeepers have been configured to perform self-zone stripping.

Head Office Configuration

The Head Office gatekeeper has been configured as follows:

- Endpoints have numbers that contain seven digits.
- Endpoints are registered with the Head Office gatekeeper.
- The zone prefix of the Head Office gatekeeper is 4.

What Happens to Incoming Calls

1. An external endpoint dials 645-2000.
2. The Head Office gatekeeper routes the call to the gatekeeper in Branch Office 645.
3. The gatekeeper in Branch Office 645 strips 645 from the number and routes the call to endpoint 2000.

What Happens to Outgoing Calls

1. Endpoint 2000 dials 4-1234567.
2. The gatekeeper in Branch Office searches in its zone for the number 4-1234567.
   - If the search is unsuccessful, the gatekeeper searches for zone prefix 4 among its children and neighbors.
   - If the search is still unsuccessful, the gatekeeper routes the call to the Head Office gatekeeper. The Head Office gatekeeper strips the 4 (zone prefix) and routes the call to its endpoint 1234567.

Parent Filters

One of the objectives of a well-defined viaIP Dial Plan is to locate endpoints efficiently. You can configure the ECS to support parent filters. When the ECS fails to resolve a destination address, the ECS searches for the destination first among its children, then among its neighbors and then via its parent. Parent filters enable the ECS to avoid unnecessary searches directed to the parent.

The ECS sends an LRQ to the Parent Gatekeeper when the dialed number of the call matches one of the defined parent filters. The Parent Gatekeeper begins searching for the destination endpoint only when the dialed number matches the parent filter.

Learn More About It *For more information about parent filters, see the ECS Services Tab and the ENC Network Configurator chapters in the viaIP ECS User Guide.*

The following example describes what happens when an ECS has been configured with parent filters:

- Branch Office gatekeeper is the child of the Head Office gatekeeper.
- Endpoint A is registered to the Branch Office gatekeeper which has been configured with parent filters 4, 0.
- Endpoint B (645-1234567) is registered to the Head Office gatekeeper.
- A Service Provider gatekeeper with zone prefix 03 and the Head Office gatekeeper are neighbors.

SCENARIO 1

1. Endpoint A dials to 4-1234567.
2. The Branch Office gatekeeper would normally send LRQs first to the children, then to the neighbors, and then to the parent. Because one of the parent filters is 4 the Branch Office gatekeeper sends an LRQ to the Head Office gatekeeper.

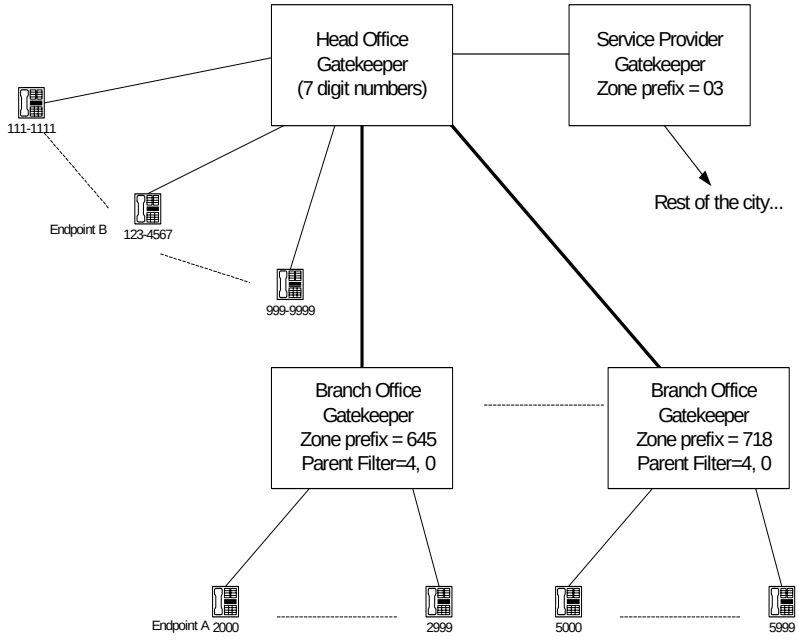

Figure 2 *Parent Filters*

SCENARIO 2

1. Endpoint A dials 03-512-776-888.
2. The Branch Office gatekeeper searches its children and neighbors but does not find an “03” match.
3. Because one of the parent filters is 0 the Branch Office gatekeeper sends an LRQ to the Head Office gatekeeper.
4. The Head Office gatekeeper searches its neighbors and finds Service Provider with prefix 03.
5. The Head Office gatekeeper routes the call to the Service Provider with prefix 03.
6. The Service Provider connects the call to the dialed endpoint.

SCENARIO 3

1. Endpoint A dials 11-512-776-888.
2. The Branch Office gatekeeper searches its children and neighbors but does not find an “11” match.
3. Because none of the parent filters begins with 1, the Branch Office gatekeeper cannot match the call and the call fails.

IMPLEMENTATION EXAMPLE

The diagram on the following page is an example of a viaIP Dial Plan implementation in an hierarchical network.

Note The dotted lines indicate Neighbor Gatekeepers.

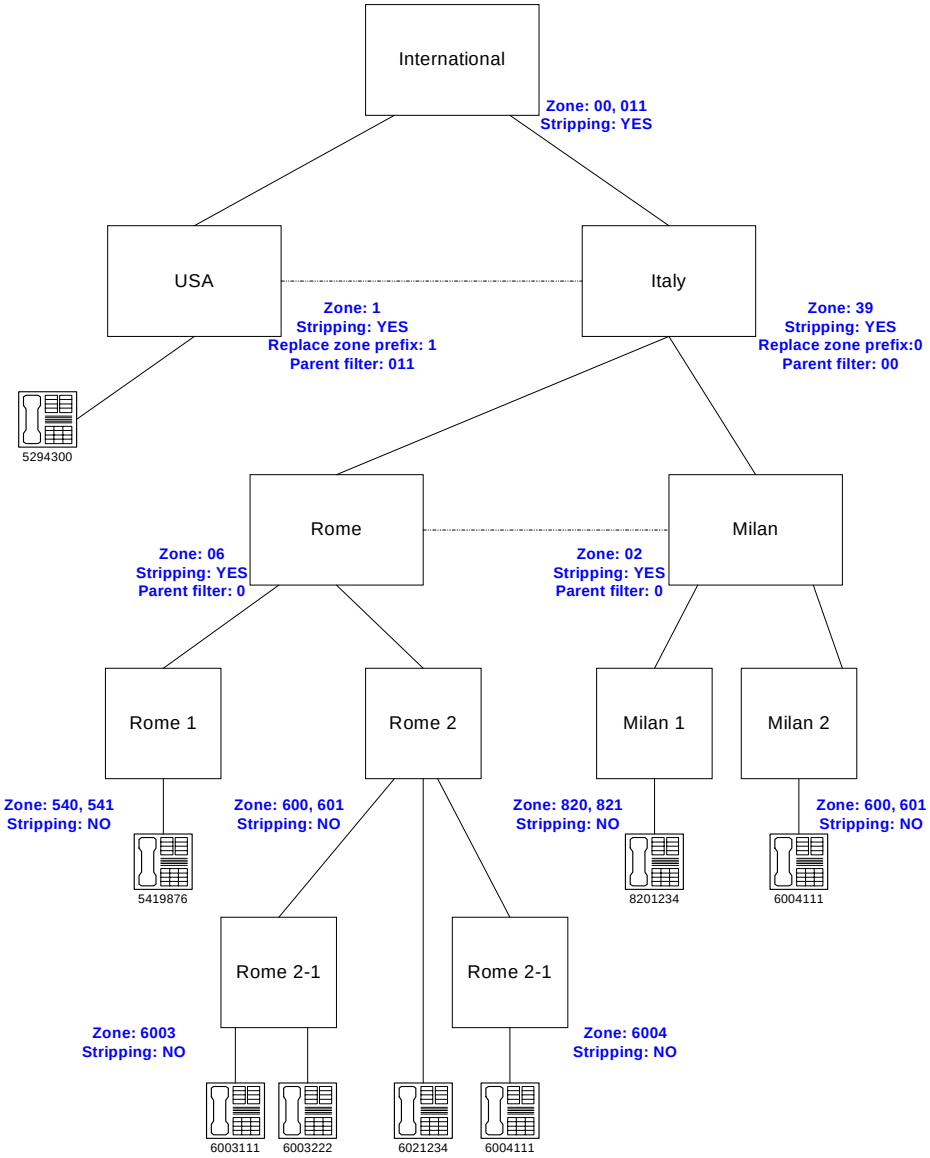

Figure 3 *Implementation Example*