How To Guide

Regular Expressions in the Dial Plan

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Startup Tool

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Revision History:

Revision	Date	Author	Comments
1		Scott Beer	First Release
2	2009-05-21	Scott Beer	Added To Header Routing

1 Regular Expressions and the SIP Protocol

Within the SIP Protocol (RFC 3261), a SIP URI identifies a communications resource. Like all URIs, SIP URIs may be placed in web pages, email messages, or printed literature. They contain sufficient information to initiate and maintain a communication session with the resource. In its simplest form a SIP URI looks like sip:user@host, where the "user" is the identifier of a particular client resource at the host being addressed. The term "host" in this context frequently refers to a network domain.

When using Regular Expressions to define a SIP URI, these expressions allow for the customization and flexibility to define SIP URIs as variables. A powerful tool when used, the regular expression can increase the capabilities of the Ingate Dial Plan as it further increases the definitions of the SIP URIs used to route calls. The Regular Expression can be used to define both the user and host portion of the SIP URI.

Industry-standard regular expressions notations:

Operator	Description
[abc]	Matches any character in the set a, b, or c.
[^abc]	Matches any character not in the set a, b, or c.
[a-z]	Any one of these; use a hyphen to indicate a range. This allows you to create a range like: "one through 8" [1-8], or a set like: "3, 6, or 9" [369].
.	Matches any single character.
,	Matches the minimum specified characters or more.
\d	Matches any decimal digit.
\D	Matches any non-digit.
\s	Matches any whitespace character.
\S	Matches any non-whitespace character.
\w	Matches any word (alphanumeric) character.
\W	Matches any non-word (alphanumeric) character.
(abc)	Matches whatever the expression abc would match, and saves it as a variable which may be used in later expressions. Also used for grouping.
$	The $ symbol is used to refer to expressions that have been stored using the ( ) expression noted above. Variables are numbered according to the order that they appear. For example, $1 refers to the first variable stored, and $2 refers to the second variable stored.
a | b	Matches whatever the expression a would match, or whatever the expression b would match.
+	Matches the preceding expression one or more times.
?	If the preceding is just a digit, allow that digit to be optional; if the preceding is inside brackets, then that sequence is optional.
*	Matches the null string or any number of repetitions of the preceding expression.
{m}	Matches exactly m repetitions of the one-character expression.
{m,n}	Matches between m and n repetitions of the preceding expression, inclusive.
{m,}	Matches m or more repetitions of the preceding expression.

2 Routing Calls using the Dial Plan

The dial plan is used to instruct the Ingate SIP Proxy or B2BUA about how to route calls; who to accept calls from, match on where calls are going to, and where to send calls. Adding regular expressions into the dial plan allows you to specify a range of numbers, range of domains, or other set of specific digits.

Regular expressions are a flexible way of delivering patterns that match a unique set of criteria. For example, if you specify the regular expression [0-9]{7,}, Ingate Firewall/SIParator recognizes any digits from zero to nine, repeated a maximum of seven times, in other words, a regular local telephone number.

2.1 Regular Expressions in the Matching From Header

The purpose of the Matching From Header is to provide source SIP URI matching, as well as source Transport and Network Address. In the Regular Expression you create criteria for the From Header SIP URI of the SIP messages. This is used when matching requests in the Dial Plan. For a request to match, all criteria must be fulfilled.

SIP URI Example Description	Equivalent Standard Expression
7-digit number@ Any Domain	sip:[0-9]{7}@(.*)
7-digit number@ IP Address	sip:[0-9]{7}@12.34.56.78
7-digit number@ Domain	sip:[0-9]{7}@sip_domain.com
North American long-distance number @ Any Domain	sip:1[2-9][0-9]{9}@(.*)
North American long-distance number @ IP Address	sip:1[2-9][0-9]{9}@12.34.56.78
North American long-distance number @ Domain	sip:1[2-9][0-9]{9}@sip_domain.com
Toll-free number: 1+800+7 digits @ Any Domain	sip:18(00 | 66 | 77 | 88)[0-9]{7}@(.*)
Toll-free number: 1+800+7 digits @ IP Address	sip:18(00 | 66 | 77 | 88)[0-9]{7}@12.34.56.78
Toll-free number: 1+800+7 digits @ Domain	sip:18(00 | 66 | 77 | 88)[0-9]{7}@sip_domain.com
Local 7-digit number, beginning with optional 9 @ Any Domain	sip:9?[0-9]{7}@(.*)
Local 7-digit number, beginning with optional 9 @ IP Address	sip:9?[0-9]{7}@12.34.56.78
Local 7-digit number, beginning with optional 9 @ Domain	sip:9?[0-9]{7}@sip_domain.com
4-digit extension starting with 5 @ Any Domain	sip:5[0-9]{3}@(.*)
4-digit extension starting with 5 @ IP Address	sip:5[0-9]{3}@12.34.56.78
4-digit extension starting with 5 @ Domain	sip:5[0-9]{3}@sip_domain.com
4-digit number not starting with 36 @ Any Domain	sip:(?!36)[0-9]{4}@(.*)
4-digit number not starting with 36 @ IP Address	sip:(?!36)[0-9]{4}@12.34.56.78
4-digit number not starting with 36 @ Domain	sip:(?!36)[0-9]{4}@sip_domain.com
Any Username @ Any Domain	sip:(.*)@(.*)
Any Username @ IP Address	sip:(.*)@12.34.56.78
Any Username @ Domain	sip:(.*)@sip_domain.com

2.2 Regular Expressions in the Matching Request URI

The purpose of the Matching Request URI is to matching on incoming Request URI Header of the SIP messages being sent to the Ingate. Typically the "domain" portion of the URI is the Ingate IP Address or FQDN. In the Regular Expression you create criteria for the Request-URI of the SIP messages. This is used when matching requests in the Dial Plan. For a request to match, all criteria must be fulfilled.

Port and Transport can be used but it only matches if there's both a port and a transport parameter contained in the SIP URI.

SIP URI Example Description	Equivalent Standard Expression
7-digit number@ Any Domain	sip:[0-9]{7}@(.*)
7-digit number@ IP Address	sip:[0-9]{7}@12.34.56.78
7-digit number@ Domain	sip:[0-9]{7}@sip_domain.com
North American long-distance number @ Any Domain	sip:1[2-9][0-9]{9}@(.*)
North American long-distance number @ IP Address	sip:1[2-9][0-9]{9}@12.34.56.78
North American long-distance number @ Domain	sip:1[2-9][0-9]{9}@sip_domain.com
Toll-free number: 1+800+7 digits @ Any Domain	sip:18(00 l 66 l 77 l 88)[0-9]{7}@(.*)
Toll-free number: 1+800+7 digits @ IP Address	sip:18(00 l 66 l 77 l 88)[0-9]{7}@12.34.56.78
Toll-free number: 1+800+7 digits @ Domain	sip:18(00 l 66 l 77 l 88)[0-9]{7}@ sip_domain.com
Local 7-digit number, beginning with optional 9 @ Any Domain	sip:9?[0-9]{7}@(.*)
Local 7-digit number, beginning with optional 9 @ IP Address	sip:9?[0-9]{7}@12.34.56.78
Local 7-digit number, beginning with optional 9 @ Domain	sip:9?[0-9]{7}@sip_domain.com
4-digit extension starting with 5 @ Any Domain	sip:5[0-9]{3}@(.*)
4-digit extension starting with 5 @ IP Address	sip:5[0-9]{3}@12.34.56.78
4-digit extension starting with 5 @ Domain	sip:5[0-9]{3}@sip_domain.com
4-digit number not starting with 36 @ Any Domain	sip:(?!36)[0-9]{4}@(.*)
4-digit number not starting with 36 @ IP Address	sip:(?!36)[0-9]{4}@12.34.56.78
4-digit number not starting with 36 @ Domain	sip:(?!36)[0-9]{4}@sip_domain.com
Remove Prefix "1613" on Any Username @ Any Domain	sip:1613(.*)@(.*)
Remove Prefix "1613" on Any Username @ IP Address	sip:1613(.*)@12.34.56.78
Remove Prefix "1613" on Any Username @ Domain	sip:1613(.*)@sip_domain.com
Remove Prefix "1613" on 11-digit number@ Any Domain	sip:1613([0-9]{7})@(.*)
Remove Prefix "1613" on 11-digit number@ IP Address	sip:1613([0-9]{7})@12.34.56.78
Remove Prefix "1613" on 11-digit number@ Domain	sip:1613([0-9]{7})@sip_domain.com
Remove optional Prefix "+" on Any Username @ Any Domain	sip:\+?(.*)@(.*)
Remove optional Prefix "+" on Any Username @ IP Address	sip:\+?(.*)@12.34.56.78
Remove optional Prefix "+" on Any Username @ Domain	sip:\+?(.*)@sip_domain.com
Any Username @ Any Domain	sip:(.*)@(.*)
Any Username @ IP Address	sip:(.*)@12.34.56.78
Any Username @ Domain	sip:(.*)@sip_domain.com

SIP URI Example Description	Equivalent Standard Expression
Any Username @ Any Domain with Port	sip:(.*)@(.*):5060
Any Username @ IP Address with Port	sip:(.*)@12.34.56.78:5060
Any Username @ Domain with Port	sip:(.*)@sip_domain.com:5060
Any Username @ Any Domain with Port and Transport	sip:(.*)@(.*):5060;transport=UDP
Any Username @ IP Address with Port and Transport	sip:(.*)@12.34.56.78:5060;transport=UDP
Any Username @ Domain with Port and Transport	sip:(.*)@sip_domain.com:5060;transport=UDP

2.3 Regular Expressions in the Forward To

The purpose of the Forward To attribute of the Dial Plan is to define where to send the SIP traffic. A specific destination SIP URI address is defined to forward the call to. The "user" and "domain" portions of the SIP URI are statically defined to ensure that SIP traffic are relayed to the correct destination.

Here you may enter Regular Expressions for the Dial Plan, used to define where and how the firewall should forward the request using the Dial Plan. A Regular Expression refers to Reg Exp subexpressions on the corresponding row in the Matching Request-URI table. Subexpressions are numbered in the order of their starting parenthesis and referred to as $number. In the expression (sip:(.+))@ingate.com, which matches any Request-URI like sip:user@ingate.com, there are two referable subexpressions: sip:user, which is referred to as $1, and user, which is referred to as $2. You can always refer to the entire Request-URI with $0, as long as the match in the Matching Request-URI table was made using a Reg Exp.

You may define lines in the Dial Plan that lack a Forward to definition. This is useful if you for example are forwarding by ENUM.

SIP URI Example Description	Equivalent Standard Expression
911 @ IP Address	sip:911@12.34.56.78
911 @ Domain	sip:911@sip_domain.com
911 or 411 @ IP Address	sip:911 l 411@12.34.56.78
911 or 411 @ Domain	sip:911 l 411@sip_domain.com
7-digit number @ IP Address	sip:9630933@12.34.56.78
7-digit number @ Domain	sip:9630933@sip_domain.com
North American long-distance number @ IP Address	sip:16139630933@12.34.56.78
North American long-distance number @ Domain	sip:16139630933@sip_domain.com
Toll-free number: 1+800+7 digits @ IP Address	sip:18668090002@12.34.56.78
Toll-free number: 1+800+7 digits @ Domain	sip:18668090002@sip_domain.com
4-digit extension @ IP Address	sip:5177@12.34.56.78
4-digit extension @ Domain	sip:5177@sip_domain.com
Use Stored Variable @ IP Address	sip:$1@12.34.56.78
Use Stored Variable @ Domain	sip:$1@sip_domain.com

SIP URI Example Description	Equivalent Standard Expression
Use Stored Variable with B2BUA @ IP Address	sip:$1@12.34.56.78;b2bua
Use Stored Variable with B2BUA @ Domain	sip:$1@sip_domain.com;b2bua
Use Stored Variable with Port @ IP Address	sip:$1@12.34.56.78:5060
Use Stored Variable with Port @ Domain	sip:$1@sip_domain.com:5060
Use Stored Variable with Port and Transport @ IP Address	sip:$1@12.34.56.78:5060;transport=UDP
Use Stored Variable with Port and Transport @ Domain	sip:$1@sip_domain.com:5060;transport=UDP
Use To Header in Request URI @ IP Address	sip:$(to.user)@12.34.56.78
Use To Header in Request URI @ Domain	sip:$(to.user)@sip_domain.com
Use To Header in Request URI and To Host in Domain and send to specified address	sip:$(to.user)@$(to.host);maddr=12.34.56.78 sip:$(to.user)@$(to.host);maddr=sip_domain.com
Add +1 in front of To Header in Request URI @ IP Address	sip:+1$(to.user)@12.34.56.78
Add +1 in front of To Header in Request URI @ Domain	sip:+1$(to.user)@sip_domain.com