

# Grandstream Networks, Inc.

# GRP26XX Carrier-Grade IP Phones

**DNS SRV Guide** 





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## **INTRODUCTION**

SRV records (Service records) are names in DNS (Domain Name System) allowing to locate servers for specific service, by providing hostname, port number, weight and priority information in response to a DNS lookup request.

DNS SRV can be used to discover the SIP server domain, in order to get registered to make and receive calls and can be also used to identify a backup SIP server domain in the event the primary server fails, providing high availability with no service interruption.

A SIP client configured with a domain name as SIP server (example: grandstream.com), if DNS lookup is using "A Record", the response from the DNS server will include a single IP address for this domain. While if this domain offers different servers for the same service (SIP), DNS SRV can help to provide hostnames, port number, weight and priority for each server, allowing SIP client to connect to the first available server (depending on priority and weight). In addition, Grandstream products support DNS SRV/NAPTR, NAPTR records are used in conjunction with SRV records to discover available services (SIP, email, web, FTP...) in a specific domain, and provide DNS SRV records as response to use for DNS lookup.

The following flow shows DNS interaction between Grandstream products and DNS server:



Figure 1: DNS Interaction





## **DNS-SRV**

#### **DNS-SRV** Format

The format for a DNS SRV lookup is the following:

#### \_Service.\_Proto.Name TTL Class SRV Priority Weight Port Target

# Table 1: DNS-SRV Fields Description Description

Fields	Description				
Service	The name of the service to resolve (http, sip, ldap).				
Protocol	The protocol used by this service (udp or tcp).				
Name	The domain name of the wanted service				
TTL	The time interval that the resource record may be cached before the source of the information should again be consulted.				
Class	<ul> <li>Specify the type of the Resource record it can be:</li> <li>IN: The Internet class</li> <li>CS: The CSNET class (Obsolete - used only for examples in some obsolete RFCs)</li> <li>CH: The CHAOS class</li> <li>HS: Hesiod [Dyer 87]</li> </ul>				
Priority	A client attempt to contact the target host with the lowest-numbered priority it can reach, target hosts with the same priority will be tried in an order defined by the weight field. The range is 0-65535				
Weight	It specifies a relative weight for entries with the same priority. Larger weight will get high priority of being selected. The range of this number is 0-65535.				
Port	The port on this target host of this service. The range is 0-65535.				
Target	The domain name of the target host. This entry should return one or more address records for this name.				

## **Configuring DNS-SRV On GRP26XX**

GRP2614 is used in this guide as example for the configuration.

Enter account credentials under "Accounts → Account X → General Settings".
 In this example: "SIP Server" is "grandstream.com" and "Outbound proxy" is "test.grandstream.com".





General Settings			
Account Active	○ No ●	Yes	
Account Name	2002		
SIP Server	grandstr	eam.com	
Secondary SIP Server			
Outbound Proxy	test.gran	dstream.com	
Backup Outbound Proxy			
BLF Server			
SIP User ID	2002		
Authenticate ID	2002		
Authenticate Password			
Name	2002		
Voice Mail Access Number			
Picture	Sele	ect	
Account Display	User	Name 🔍 User ID	
	Save	Save and Apply	Reset

Figure 2: GRP2614 SIP Configuration

2. Set "DNS Mode" to "SRV" under "Accounts → Account X → Network Settings"

Network Settings	
DNS Mode	SRV •
DNS SRV Fail-over Mode	Default ▼
Primary IP	
Backup IP 1	
Backup IP 2	
NAT Traversal	No 🔻
Proxy-Require	
Use SBC	● No ○ Yes
	Save Save and Apply Reset

Figure 3: Network Settings





The table below explains available options related to DNS configuration:

Field	Description
DNS Mode	This parameter controls how the search appliance looks up IP addresses for hostnames. There are four modes: A Record, SRV, NAPTR/SRV, Use Configured IP. The default setting is "A Record". If the user wishes to locate the server by DNS SRV, the user may select "SRV" or "NAPTR/SRV". If "Use Configured IP" is selected, please fill in the three fields below: • Primary IP. • Backup IP 1. • Backup IP 2. If SIP server is configured as domain name, phone will not send DNS query, but use "Primary IP" or "Backup IP x" to send SIP message if at least one of them are not empty. Phone will try to use "Primary IP" first. After 3 tries without any response, it will switch to "Backup IP x", and then it will switch back to "Primary IP" after 3 re-tries. If SIP server is already an IP address, phone will use it directly even "User Configured IP" is selected.
DNS SRV Fail- over Mode	<ul> <li>The option will decide which IP is going to be used in sending SIP packets after IPs for SIP server host are resolved with DNS SRV.</li> <li>Default</li> <li>If the option is set with "default", it will again try to send register messages to one IP at a time, and the process repeats.</li> <li>Saved one until DNS TTL</li> <li>If the option is set with "Saved one until DNS TTL", it will send register messages to the previously registered IP first. If no response, it will try to send one at a time for each IP. This behavior lasts as long as DNS TTL (time-to-live) is up.</li> <li>Saved one until no responses</li> <li>If the option is set with "Saved one until no responses", it will send register messages to the previously registered IP first, but this behavior will persist until the registered server does not respond.</li> </ul>

#### Table 2: Phone DNS Settings

#### **DNS-SRV Lookup**

In order to Register account in the above example, the phone will try to resolve the domain "test.grandstream.com", therefore:

- The phone will send a SRV lookup for "test.grandstream.com".
- The DNS server will reply with a list of FQDN's with different weight and priorities.
- The phone will issue an A record query for all the FQDNs (Fully qualifies domain names) starting from the one with the lowest priority number.
- The DNS server will send back the IP addresses associated with those FQDNs.
- The phone will then send SIP REGISTER request to the IP address associated with the lowest priority number returned by the SRV lookup.





#### **Registration Process**

If the primary SIP server where the phone is registered (192.168.10.13) fails, the phone act as follow:

- After the register expiration, the phone will send 3 SIP REGISTER requests to the primary server, and won't get a reply.
- The phone will consider the server not available and then send a REGISTER request to the backup server (192.168.10.12).

No.	Time	Source	Destination	Protocol	Info	
	53 5.711	192.168.10.10	192.168.10.13	SIP	Request: REGISTER sip:grandstream.com	(1 binding)
1	54 5.767	192.168.10.13	192.168.10.10	SIP	Status: 200 OK (1 binding)	
5	55 51.844	192.168.10.10	192.168.10.13	SIP	Request: REGISTER sip:grandstream.com	(1 binding)
9	70 52.343	192.168.10.10	192.168.10.13	SIP	Request: REGISTER sip:grandstream.com	(1 binding)
5	90 53.344	192.168.10.10	192.168.10.13	SIP	Request: REGISTER sip:grandstream.com	(1 binding)
10	10 55.349	192.168.10.10	192.168.10.12	SIP	Request: REGISTER sip:grandstream.com	(1 binding)
10	13 55.366	192.168.10.12	192.168.10.10	SIP	Status: 401 Unauthorized	
10	14 55.372	192.168.10.10	192.168.10.12	SIP	Request: REGISTER sip:grandstream.com	(1 binding)
10	15 55.390	192.168.10.12	192.168.10.10	SIP	Status: 200 OK (1 binding)	

**Figure 4: Registration Process** 

Once the primary server returns to normal, after the register expiration the phone will send again REGISTER request to the primary server.

Note: The same REGISTER process is applied for INVITE and BYE messages.

No. Time Source	Destination	Protocol	Lenath Info
238 51 27 192 168 10 11	192 168 10 10	DNS	90 Standard query 0x0008 SRV sin udn test grandstream com
41 51.27!192.168.10.10	192.168.10.11	DNS	241 Standard query response 0x0008 SRV 2 1 5060 test1.grandstream.com SRV 1 1 5060 test2.grandstream.com
242 51.28 192.168.10.11	192.168.10.10	DNS	81 Standard query 0x0009 A test2.grandstream.com
243 51.28 192.168.10.10	192.168.10.11	DNS	122 Standard query response 0x0009 A 192.168.10.13
244 51.29!192.168.10.11	192.168.10.10	DNS	81 Standard query 0x000a A test1.grandstream.com
245 51.29 192.168.10.10	192.168.10.11	DNS	122 Standard query response 0x000a A 192.168.10.12
HI SID. UOD.TEST.Grand	ISTREAM.COM: TYPE	SKV, CI	ass in
<pre>Answers    </pre>	lstream.com: type tream.com Selection) (33) ) ndstream.com lstream.com: type tream.com Selection) (33) )	SRV, cl	ass IN, priority 2, weight 1, port 5060, target test1.grandstream.com ass IN, priority 1, weight 1, port 5060, target test2.grandstream.com
Port: 5060			
Target: test2.gram	ndstream.com		
Authoritative nameserv	ers		
🕀 grandstream.com: typ	e NS, class IN,	ns elmra	bet-pc
Additional records			
test1.grandstream.co	om: type A, class	IN, add	r 192.168.10.12
	om: type A, class	IN, add	r 192.168.10.13

Figure 5: SRV Lookup





# **DNS NAPTR/SRV**

## **DNS NAPTR/SRV Format**

NAPTR resource records are used to replace compact, regular expressions with a replacement field that may well be a pointer to another rule, its DNS-type code is 35.

The format of an NAPTR record is as follows:

Domain	TTL	Class	Туре	Order	Preference Flags	Service	Regexp
Replacem	ent						

Fields	Description
Domain	The domain name to which this resource record refers
TTL	Specify the time interval that the resource record may be cached before the source of the information should again be consulted.
Class	<ul> <li>Specify the type of the Resource record it can be:</li> <li>IN: The Internet class</li> <li>CS: The CSNET class (Obsolete - used only for examples in some obsolete RFCs)</li> <li>CH: The CHAOS class</li> <li>HS: Hesiod [Dyer 87]</li> </ul>
Туре	DNS type code for NAPTR is 35
Order	Specify the order in which the NAPTR records need to be processed, low numbers are processed before high numbers.
Preference	Specifies the order in which NAPTR records with the same "Order" values need to be processed. records are processed from lower preference numbers to higher preference numbers.
Flags	<ul> <li>Indicate what happens next after this lookup, at this time 4 flags are defined.</li> <li>The "S" flag indicates that the next lookup should be an SRV lookup.</li> <li>The "A" flag indicates that the next step is a DNS A, AAAA, A6 record lookup.</li> <li>The "U" flag means that the next step is not a DNS lookup but that the output of the Regexp field is an URI that adheres to the 'absoluteURI'.</li> <li>The "P" flag indicates that the remainder of the lookup are defined by the application that uses the NAPTR.</li> </ul>
Service	Specifies the services available in this domain. The replacement field is used to get to this service. It can also specify the protocol used to communicate with the

#### Table 3: DNS-NAPTR/SRV Fields Description





	erver that offers this service. In SIP, three services are defined along with their					
	esolution services (resolution services are defined after the "+" sign):					
	• "SIPS+D2T": Secure SIP, TLS over TCP.					
	• "SIP+D2T": SIP over TCP.					
	• "SIPS+D2S": Secure SIP, TLS over SCTP.					
	• "SIP+D2S": SIP over SCTP.					
	• "SIP+D2U":SIP over UDP.					
Regexp	Carries a substitution expression that is applied to the original domain name in					
	order to construct a new domain name for the next lookup.					
Replacement	The next name used to query a DNS. This could be another NAPTR, SRV or A					
	record. In SIP the replacement fields are SRV RRs and hence the flag field is					
	set to "S".					

## **DNS NAPTR/SRV Lookup**

Using the GRP2614 for example the DNS settings can be found under "Accounts  $\rightarrow$  Account X  $\rightarrow$  Network Settings".

Network Settings	
DNS Mode	NAPTR/SRV •
DNS SRV Fail-over Mode	Default <b>v</b>
Primary IP	
Backup IP 1	
Backup IP 2	
NAT Traversal	No 🔻
Proxy-Require	
Use SBC	● No ○ Yes
	Save Save and Apply Reset

Figure 6: Network Settings 2





Using the example in Figure 1, in order to register the account, the phone will make the following lookup:

- The phone will send a NAPTR lookup for the domain "test.grandstream.com".
- The server will return back a NAPTR record reply that contain the next step for the lookup.
- The phone will send an SRV lookup for using parameters returned on the NAPTR record.
- The DNS server will reply with a list of FQDN's with different weight and priorities.
- The phone will issue an A record query for all the FQDNs starting from the one with the lowest priority number.
- The DNS server will send back the IP addresses associated with those FQDNs.
- The phone will then send SIP REGISTER request to the IP address associated with the lowest priority number returned by the SRV lookup.

No. Time Source Destination Protocol Length Info
254 16.08:192.168.10.11 192.168.10.0 DNS 80 Standard query 0x0140 NAPTR test.grandstream.com
255 16.08:192.168.10.10 192.168.10.11 DNS 164 Standard query response 0x0140 NAPTR 80 60 s
256 16.10/192.168.10.11 192.168.10.10 DNS 90 Standard query UX0141 SKV _sipudp.test.grandstream.com
257 16.10/192.168.10.10 192.168.10.11 DNS 241 Standard query response 0x0141 SRV 2 1 5060 test1.grandstream.com SRV 1 1 5060 test2.grandstream.co
258 16.10!192.168.10.11 192.168.10.10 DNS 81 Standard query 0x0142 A test2.grandstream.com
259 16.10192.168.10.10 192.168.10.11 DNS 122 Standard query response 0x0142 A 192.168.10.13
260 16.11:192.168.10.11 192.168.10.10 DNS 81 Standard query 0x0143 A test1.grandstream.com
261 16.11:192.168.10.10 192.168.10.11 DNS 122 Standard query response 0x0143 A 192.168.10.12
[Request In: 254]
[Time: 0.000679000 seconds]
Transaction ID: 0x0140
⊞ Flags: 0x8580 Standard query response, No error
Questions: 1
Answer RRs: 1
Authority RRs: 1
Additional RRs: 0
■ test.grandstream.com: type NAPIR, class IN
Answers
Name test organization com
Type: NAPTR (Naming Authority Pointer) (35)
Class: N (hydrol)
Time to live: 3
Data length: 47
Order: 80
Preference: 60
Flags Length: 1
Flags: s
Service Length: 7
Service: SIP+D2U
Regex Length: 0
Regex:
[Replacement Length: 32]
Replacement: _sipudp.test.grandstream.com
🖂 Authoritative nameservers
🗄 grandstream.com: type NS, class IN, ns elmrabet-pc

Figure 7: DNS NAPTR/SRV Lookup

Note: The registration process is the same as described previously on SRV section.





## **DNS SERVER CONFIGURATION**

A trial Version of **Simple DNS Plus** is used as DNS server in this example.

In order to configure Simple DNS with SRV and NAPTR records please follow those steps:

- 1. Download and install Simple DNS plus from this link: SimpleDNSPlus.
- 2. Open Simple DNS Plus and Click on Records to start configuration.



Figure 8: Configure Records

3. Create a new Primary Zone.





File Edit View Tools Help		
New Quick Save Cut Cop	y Paste Delete Properties Bulk	
Z New Zone Ctrl+N		
New Zone Group	Name Type TTL Data	Comments
Secondary Zones		
. Zone Groups		
		F.

#### Figure 9: New Zone

4. The following window will be prompt, select Forward Zone and Click "Next".

New Zone Wizard				
Select the type of Primary zone you want to create:				
Forward Zone A forward zone holds DNS records for domain name to IP address lookups, as well as other DNS record types. This is the most common zone type.				
Reverse Zone A reverse zone holds DNS records for IP address to domain name lookups. Use the "Reverse Zone Wizard" to create and modify records.				
Alias Zone Creates a new zone which shares its DNS records and settings with another zone. This can save a lot time when managing a large number of zones with identical data. Warning: Chages made in one zone reflects in all aliased zones.				
< Back Next > Cancel				

Figure 10: Forward Zone

5. Enter the name of your zone which is "grandstream.com" in this example, then click on "Finish".





New Zone Wizard	THAT -
New Primary Forward Zone	
Zone Name:	
grandstream.com	
	< Back Finish Cancel

Figure 11: Zone Name

Once the zone is created successfully, start creating the records as shown in the following figure:

6. Right Click on the zone created which is "grandstream.com" then select "**Other New Records**" and click on "**NAPTR-record**", this will create our NAPTR record.

Suspend
Make Copy
Move to Group A6-record (IPv6 Prefix/Suffix)
Delete AFSDB-record (AFS Data Base Location)
DNSSEC sing ATMA-record (ATM Address)
DNAME-record (Name Redirection)
New A-record (Host Address) DS-record (Delegation Signer)
New AAAA-record (IPv6 Host Address) HINFO-record (Host Information)
New CNAME-record (Alias) ISDN-record (ISDN Address)
New MX-record (Mail Exchange) LOC-record (Location Information)
New NS-record (Name Server) MB-record (Mailbox)
New SPF-record (Sender Policy Framework) MG-record (Mail Group Member)
New TXT-record (Text Strings) MINFO-record (Mailbox or Mail List Information)
Other new record  MR-record (Mail Rename)
Properties NAPTR-record (Naming Authority Pointer)
NSAP-record (NSAP Address)
PTR-record (Pointer)
RP-record (Responsible Person)
RT-record (Route Through)
SRV-record (Server Selection)
ecords X25-record (X.25 PSDN Address)

Figure 12: New NAPTR Record

7. Fill the information related to the NAPTR record and click "OK" as shown below.





test.grandstre	am.com
<u>.</u>	
Order:	Preference:
80	60
Flags:	
s	
<b>.</b> .	
Services:	
SIP+D20	
Regular expre	ssion:
	(FODN)
Replacement	(FQDN):
and the second second	grandstream com
_sipudp.test	
_sipudp.test Record TTL (	Time To Live):
_sipudp.test Record TTL ( 3	Time To Live):
_sipudp.test Record TTL ( 3	Time To Live): Seconds ▼
_sipudp.test Record TTL ( 3 Record comm	Time To Live): Seconds

Figure 13: NAPTR Record

8. Create SRV records by clicking on "grandstream.com" zone, then select "Other New Records" and click on "SRV-record", this will create our NAPTR record.

grandstream.com	
Save	
Suspend Make Copy Move to Group Delete	A6-record (IPv6 Prefix/Suffix) AFSDB-record (AFS Data Base Location) ATMA-record (ATM Address) DNAME-record (Name Redirection)
DINSSEC sign	DS-record (Delegation Signer)
New A-record (Host Address) New AAAA-record (IPv6 Host Address)	HINFO-record (Host Information) ISDN-record (ISDN Address)
New CNAME-record (Alias)	LOC-record (Location Information)
New MX-record (Mail Exchange)	MB-record (Mailbox)
New NS-record (Name Server)	MG-record (Mail Group Member)
New SPF-record (Sender Policy Framework)	MINFO-record (Mailbox or Mail List Information)
New TXT-record (Text Strings)	MR-record (Mail Rename)
Other new record	NAPTR-record (Naming Authority Pointer)
Properties	NSAP-record (NSAP Address)
	PTR-record (Pointer)
	RP-record (Responsible Person)
	RT-record (Route Through)
	SRV-record (Server Selection)
7 DNS Records	X25-record (X.25 PSDN Address)

Figure 14: New SRV Record

9. Fill the information related to the SRV record and click "OK" as shown below.





_sipudp.test.g	grandstream.com		
Priority:	Weight:	Port:	
2	1	5060	
Target host (FG	(DN):		
test1.grandstrea	am.com		
Record TTL (Ti	ime To Live):		
	me to uvej.		
3	Seconds -		
3	Seconds 💌		

Figure 15: SRV Record

10. Click on "grandstream.com" zone to Create SRV records, then select "Other New Records" and select "SRV-record", this will create our NAPTR record.

😰 grandstream.com	
	Save
	Suspend
	Make Copy
	Move to Group
	Delete
	DNSSEC sign
	New A-record (Host Address)
	New AAAA-record (IPv6 Host Address)
	New CNAME-record (Alias)
	New MX-record (Mail Exchange)
	New NS-record (Name Server)
	New SPF-record (Sender Policy Framework)
	New TXT-record (Text Strings)
	Other new record
	Properties

Figure 16: New A Record

11. Fill the information related to the A record and click "OK" as shown below.





Record name (host):	
test1.grandstream.com	
Host IP address:	
192.168.10.12	
Record TTL (Time To Live): 3 Seconds	
Record comments:	

Figure 17: A Record

Once all the Records are created, click on Save Zone as shown below to save the zone and finish the

Server configuration.

File Edit View Tools Help			
New Quick Save Cut Copy F	Paste Delete Properties	B ulk Help	
Zones	grandstream.com		
All Zones Q Changes made to this zone have not been saved and go and use and by DNS.			d an anti-unit sumitable through DNS.
Primary Zones     Secondary Zones	Name	Type TTL	Data Comments
Zone Groups	_sip _udp test grandstream.com _sip _udp test grandstream.com grandstream.com grandstream.com test grandstream.com test 1.grandstream.com test 2.grandstream.com	SRV         3           SRV         3           SOA         1080           NS         1080           MAPTR         3           A         3           A         1080	[2, 1, 5060] test 1.grandstream.com [1, 1, 5060] test 2.grandstream.com elmrabet.pc [2016090607] elmrabet.pc 80, 60, "s", "SIP+D2U", "", _sip,_udp.test.grandstream.com 192.168.10.12 000 192.168.10.13

Figure 18: Save Settings

