

Performance Guide

IPS Global Directory



Directory

Phone Directory
Jabber UDS Server
Web Directory
IPS Popup / Reverse Lookup
Personal Directory
H350 Video Conf directory
Corporate Speed Dials
ClickNDial

Alerting

Voice Alert
IPS Pager

Admin tools

Morning Check
Phone Remote
Phone Robot
Provisioning
Phone Deployment
CMS Admin & Selfcare
Extension Mobility Report

Manager Assistant

IP Phone / Jabber Interface

Productivity tools

IPS Phone Config
IPS Alarm Callback
IPS Lock
Wakeup Call
Missed Call Alerter
Conference Center
Busy Alerter Callback
Desktop Popup
Finesse Gadgets
Spark Bot

Attendant Console / IVR / Group

Tannounce
Line Group Manager
Silent Monitoring

Extension Mobility tools

TSSO
Delog / Relog
Pin & Password Manager

Recording

Call Recording
Recording Notification

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1. Overview

The purpose of this guide is to evaluate the workload of IPS Global Directory for the different type of searches mode, from IP Phone, Web Interface, Jabber and Reverse Lookup. The goal is to provide a planning guide on the amount of CPU required depending of the number of users and the mix of search modes.

2. IPS Global Directory usage estimation

We have estimated the usage of IPS Global Directory, based on a BHCA (Busy Hour Call Average) of 6, as following:

Outbound calls: 2 searches / hour

Inbound calls: 4 searches / hour (in case of Reverse Lookup)

We have applied a security of 1.5 on this evaluation.

For example:

```
For 10 000 users
Search on the phone 2 / hour, with security of 1.5 makes:
10 000 * 2 / 3600 * 1.5 = 8,3 searches / seconds
In SMS mode, displaying the search screen, searching, displaying,
browsing the result and dialling generate 5 queries.
Then 10 000 users will generate 41 requests / second.
```

3. Test environment

IPS Global Directory configuration

- Two source directories (not merged) of 170 000 contacts each
- 11 contact's columns filled

Server configuration

- Virtual Machine
- 2 & 4 vCPU (3.3GHz)
- 4 GB to 8 GB of memory

Load simulator

We are using a load simulator to generate HTTP requests in parallel so that we match the required number of http request per second in the grid result.

$$\# \text{ requests / sec} = \# \text{ users} \times \# \text{ requests per search} \times \# \text{ searches/h} \times 1.5 / 3600$$

Each test was executed at least one minute.

Requests where considered as failed when the timeout was more than 1 second for a search on a Phone or was more than 3 seconds when searching from Jabber or Web Directory.

For each test we have measured the average CPU load and maximum CPU load.

4. Searching from IP Phone in SMS mode

Each search requires 5 requests:

- Display directories' list
- Display input screen
- Display result
- Display list of phones or detail
- Dial or quit

With 2 vCPUs

# Users	# Requests / sec goal	# Requests / sec measured	% CPU average / maximum	# Timeout %
2000	8	8	11/59	-
4000	16	16	17/88	-
6000	25	21	28/90	-
8000	33	33	35/95	-
10000	41	35	32/97	-
12000	49	47	32/96	-
14000	58	55	27/100	-
16000	66	61	42/100	-
18000	75	73	39/98	-
20000	83	81	51/100	-
30000	124	106	53/100	2
40000	166	141	53/100	2
50000	208	181	54/100	2.3
60000	250	208	55/100	4

With 4 vCPUs

# Users	# Requests / sec goal	# Requests / sec measured	% CPU average / maximum	# Timeout %
2000	8	6	3/14	-
4000	16	13	3/17	-
6000	25	17	5/24	-
8000	33	23	8/35	-
10000	41	28	7/36	-
12000	49	41	9/42	-
14000	58	49	10/41	-
16000	66	57	17/56	-
18000	75	61	17/53	-
20000	83	67	16/59	-
30000	124	79	23/81	-
40000	166	109	34/79	-
50000	208	136	33/65	-

60000	250	158	41/92	-
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5. Searching from IP Phone in T9 Iterative mode

The number of requests may vary depending of the size of the directory. For a large directory we assume that to find DUPONT, the user has to enter enough digits to enter '53726' which matches 'DUPON' in T9. Each time a digit is hit, a request is sent to the server which returns a graphic page until it displays a list of results.

Each search generates an average of 9 requests.

- Display directories' list
- Display T9 graphic's search screen
- 5 times a digit is entered
- Display detail or a list of phones per contact
- Dial or quit

With 2 vCPUs

# Users	# Requests / sec goal	# Requests / sec measured	% CPU average / maximum	# Timeout %
2000	15	15	16/58	-
4000	30	29	17/68	-
6000	45	43	24/79	-
8000	60	57	33/87	-
10000	75	70	35/91	-
12000	90	80	44/100	-
14000	105	92	50/100	-
16000	120	105	48/100	-
18000	135	114	47/100	3
20000	150	108	67/100	12
30000	225	105	84/100	63
40000	300	137	91/100	66
50000	375	156	88/100	61
60000	400	202	86/100	53

With 4 vCPUs

# Users	# Requests / sec goal	# Requests / sec measured	% CPU average / maximum	# Timeout %
2000	15	15	7/26	-
4000	30	29	12/45	-
6000	45	43	15/38	-
8000	60	57	20/71	-
10000	75	72	26/77	-
12000	90	86	27/68	-
14000	105	96	28/75	-
16000	120	112	36/85	-
18000	135	114	39/96	1

20000	150	124	40/91	4
30000	225	155	58/100	7
40000	300	184	60/100	19
50000	375	208	63/100	17
60000	400	181	64/100	53

6. Search from Cisco Jabber in UDS mode

In this mode, IPS Global Directory replaces Cisco UDS Directory.

We have simulated a search on Last Name and the first character of the First Name (For, example, by entering 'legrand l') as it requires more resources than searching on only the last name. As Jabber begin to send a request on the third character entered, this search generates 6 requests x 2 / hour.

When a Jabber receives a call it also generates a reverse lookup request (4 requests / hour).

2000 users => $2000 * 16 * 1.5 / 3600 = 13.3 \text{ req/sec}$

Note: When launching Cisco Jabber it also send a bulk request with the list of the buddy list. This request has not been included in the test as it is only when Jabber's start.

With 2 vCPUs

# Users	# Requests / sec goal	# Requests / sec measured	% CPU average / maximum	# Timeout %
2000	15	16	16/46	-
4000	25	24	27/54	-
6000	33	31	28/62	-
8000	41	38	28/59	-
10000	49	46	36/86	-
12000	58	50	31/95	-
14000	66	55	41/100	1.44
16000	75	66	56/93	0.7
18000	86	67	61/100	3
20000	124	80	72/100	12
30000	166	92	82/100	27
40000	208	93	84/100	79
50000	250	108	87/100	87

With 4 vCPUs

# Users	# Requests / sec goal	# Requests / sec measured	% CPU average / maximum	# Timeout %
2000	16	12	10/22	-
4000	25	16	18/25	-
6000	33	23	17/32	-
8000	41	28	19/26	-
10000	49	34	16/36	-

12000	58	37	25/55	-
14000	66	41	25/84	-
16000	75	47	27/62	-
18000	86	52	36/85	-
20000	124	70	53/86	-
30000	166	74	73/100	11
40000	208	88	75/100	17
50000	250	85	85/100	42

7. Searching from Web Directory

When searching from Web Directory, on request is enough to, search and displays the result.

Note: We have ignored the power search on the last name which could be enabled to search the first occurrences after entering the third character. This request is highly optimized and should not increase the workload.

With 2 vCPUs

# Users	# Requests / sec goal	# Requests / sec measured	% CPU average / maximum	# Timeout %
2000	3	3	10.6/42	-
4000	6	6	35.3/86	-
6000	10	10	17.6/54	-
8000	13	13	20/69	-
10000	16	16	18/45	-
12000	20	19	20.3/56	-
14000	23	21	25.9/67	-
16000	26	23	30.2/74	-
18000	30	28	31.3/82	-
20000	33	31	36.4/89	-
30000	50	42	39.6/100	-
40000	66	48	53.7/98	-
50000	83	58	60.4/100	-
60000	100	70	63.1/99	-

With 4 vCPUs

# Users	# Requests / sec goal	# Requests / sec measured	% CPU average / maximum	# Timeout %
2000	3	3	2.6/11	-
4000	6	6	4.7/25	-
6000	10	10	4.2/17	-
8000	13	13	5.3/18	-
10000	16	16	10.7/28	-
12000	20	20	12.1/45	-
14000	23	22	14.5/55	-
16000	26	25	17.2/66	-
18000	30	29	15.2/41	-

20000	33	30	21/93	-
30000	50	48	27.8/70	-
40000	66	40	34.1/70	-
50000	83	77	33.8/80	-
60000	100	81	41.2/89	-

8. CTI Popup (Reverse Lookup)

When a call rings on a phone, a CTI event generate a search requests and the calling contact is displayed on the phone. Only one request is sent on the server for each inbound call (4 / busy hour).

Note: The tests do not take into account the CTI (JTAPI) workload.

With 2 vCPUs

# Users	# Requests / sec goal	# Requests / sec measured	% CPU average / maximum	# Timeout %
2000	3	3	5/25	-
4000	6	6	4/19	-
6000	10	10	7/61	-
8000	13	9	11/38	-
10000	16	16	15/38	-
12000	20	19	20/80	-
14000	23	23	14/61	-
16000	26	26	15/45	-
18000	30	30	22/58	-
20000	33	33	16/65	-
30000	50	48	18/70	-
40000	66	64	29/74	-
50000	83	77	33/79	-
60000	100	90	35/100	-

With 4 vCPUs

# Users	# Requests / sec goal	# Requests / sec measured	% CPU average / maximum	# Timeout %
2000	3	5	4/12	-
4000	6	7	4/11	-
6000	10	11	7/15	-
8000	13	13	6/21	-
10000	16	16	6/21	-
12000	20	20	8/35	-
14000	23	23	8/34	-
16000	26	26	9/41	-
18000	30	20	6/37	-
20000	33	23	9/47	-
30000	50	49	20/40	-

40000	66	66	21/43	-
50000	83	82	27/81	-
60000	100	100	32/66	-

9. Reverse Lookup with ECCP

Each time an inbound call rings (4 in busy hours), one query is sent by an ECCP (External Call Control Profile) to IPS Global Directory.

With 2 vCPUs

# Users	# Requests / sec goal	# Requests / sec measured	% CPU average / maximum	# Timeout %
2000	3.3	3	5/21	-
4000	6.6	6	6/23	-
6000	10	11	5/27	-
8000	13	13	12/38	-
10000	16	15	11/32	-
12000	20	20	13/36	-
14000	23	23	10/46	-
16000	26	26	12/37	-
18000	30	29	15/52	-
20000	33	32	13/55	-
30000	50	49	25/58	-
40000	66	66	22/75	-
50000	83	81	35/84	-
60000	100	95	36/87	-

With 4 vCPUs

# Users	# Requests / sec goal	# Requests / sec measured	% CPU average / maximum	# Timeout %
2000	3	3	4/13	-
4000	6	6	3/18	-
6000	10	11	3/29	-
8000	13	12	3/31	-
10000	16	15	7/39	-
12000	20	20	7/25	-
14000	23	23	8/26	-
16000	26	25	8/33	-
18000	30	27	10/28	-
20000	33	32	12/40	-
30000	50	49	17/55	-
40000	66	63	23/69	-
50000	83	82	24/69	-
60000	100	95	22/50	-

10. Sizing and planning calculation

Memory and disk planning

The memory usage is related to the size of the directories.

The minimum memory size is 4GB, if the total size of the source directories is more than 150 000 contacts, 8GB of memory is advised.

Except for Windows Server operating system, the disk is mainly used to store the directories and logs. By default, the last 14 days of directories and logs are archived. The minimum disk size advised is 80 GB. However, 0.5GB of disk should be added per 100 000 contacts of directories' size.

CPU sizing

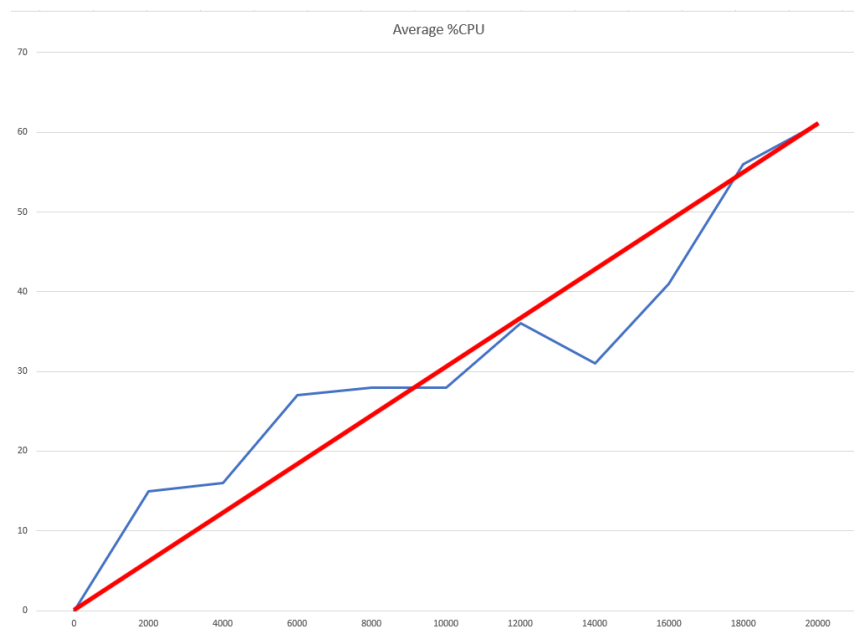
This chapter gives the tools to evaluate the work load and then plan the server CPU sizing taking into account the number of users and the different modes of searching.

Two methods are used:

- Evaluate the average % of CPU used
- Evaluate the number of vCPU required based on the maximum users handled.

The maximum number of users handled is the limit before the CPU raise up to 100% for more than one second and/or some timeouts are detected.

To simplify the calculation, we have used a linear approximation of the tests results.



Example for T9 Iterative search with 2 vCPU

Average % CPU for 20 000 users = 2 x 62%

→ By kU (1000 users), the average % CPU is **6.2 kU**

Maximum users handled with 2 vCPU = 14 000

→ By kU (1000 users) the advised vCPU sizing is **0.14 kU**

Search mode	Average %CPU / kU	Advised #vCPU / kU
From IP Phone SMS mode	2.6 x kU	0.06 x kU
From IP Phone T9 iterative mode	6.2 x kU	0.14 x kU
From Jabber by UDS directory	7.0 x kU	0.16 x kU
From Web Directory	3.6 x kU	0.1 x kU
Reverse lookup by CTI Popup	2.0 x kU	0.05 x kU
Reverse lookup by ECCP	1.5 x kU	0.03 x kU

Sizing examples

It is possible to calculate the estimated average %CPU and advised number of vCPUs by mixing different search modes. If a user can access to different search modes, we select the one which requires the mode CPU resources. For example, if they are 6000 users with an IP Phone and 2000 of these users also have a Cisco Jabber, we will consider 4000 Phone searches + 2000 Jabber searches.

# Users	Average %CPU	Calculated vCPU	# advised vCPU
8000 IP Phones SMS 2000 Web Directory	20%	0.68	1
4000 IP Phones T9 Iterative 2000 Jabber UDS 6000 Reverse Lookup by ECCP	48%	1.06	1
20 000 IP Phones SMS 20 000 Reverse Lookup by ECCP	82%	1.8	2
50 000 IP Phones SMS	130%	3	3
10 000 IP Phones T9 Iterative 10 000 Web Directory 10 000 Reverse Lookup CTI Popup	118%	2.9	3
30 000 IP Phones SMS 15 000 Jabber UDS	183%	3.9	4