

TWAREN perfSONAR-based 網路效能監測系統

楊哲男 2013/05/01@台中區域網路中心管理委員會

Outline

- ◆ perfSONAR Toolkit介紹
 - 動機
 - What is perfSONAR ?
- ◆ 如何利用perfSONAR建置網路效能量測系統
 - 建置方法
 - 設定方法
- ◆ TWAREN線上測速系統

動機

為何需要網路效能量測？

- ◆ 網路應用者對於網路品質是貪婪的
- ◆ 網路設計者較考慮保護性(protection)及可用性(availability)甚於網路效能
- ◆ 通訊協定(TCP/IP)的進步比不上網路基礎設施的進步
- ◆ 網路管理者的職責
- ◆ “Big” Science正在全球流行

Typical Scenario

- ◆ 使用者想抓取檔案(例如約600MB大小)
- ◆ 使用一般常用scp或是透過網頁抓取
- ◆ 使用者所期待的
 - 對外網路是1Gbps
 - $600\text{MB} * 8 = 4800\text{Mb}$
 - 預期傳輸時間: $4800\text{Mb} / 1000\text{Mbps} = 4.8\text{秒}$
- ◆ 可能出現的結果
 - 傳輸速度顯示每秒只有幾MB或是幾KB的速度
 - 網路擁塞及其他因素?
 - 使用者主機效能、通訊協定的選擇、應用程式的效能?
- ◆ 該如何解決??

使用者解決步驟

- ◆ Application Level
 - 是否有其他使用者反應一樣問題？所使用的傳輸程式版本是否為最新？
- ◆ Protocol Level
 - 通訊協定是否有做過調整優化？
- ◆ Host Level
 - 硬體(網卡、CPU)、軟體(驅動程式、作業系統)是否運作正常
- ◆ LAN Networks
 - 詢問當地的網管目前之網路狀態
- ◆ Backbone Networks
 - 詢問遠端之骨幹網管目前之網路狀態

實際可能發生情形

- ◆ Application Level
 - 這步驟會被省略，程式開發者或使用者會直接抱怨網路有問題
- ◆ Protocol Level
 - 直覺認為這部份應該是自動化調整才對
- ◆ Host Level
 - Ping得通之後，就停止檢查及診斷主機狀態
- ◆ LAN Networks
 - 網管認為內部網路是良好的並認為是來源端的網路問題
- ◆ Backbone Networks
 - 網管認為骨幹還很空，認為是來源端或目的端的網路問題

解決時可能發生的問題

- ◆ 缺乏清楚的處理程序
 - 正確處理問題的程序其所需的知識很重要
 - 所需的知識不僅對使用者很重要，對於程式開發者及網路管理者亦相當的重要
- ◆ 處理事情缺乏耐心
 - 使用者對管理者抱怨，而管理者不想聽到使用者的抱怨
- ◆ 無效的資訊來源
 - 缺乏有效的效能資訊，例如目前的提供對外的網路之效能為何？
- ◆ 溝通問題
 - 有問題時該找誰詢問及幫忙(往往會不知找誰)

可能的解決方法

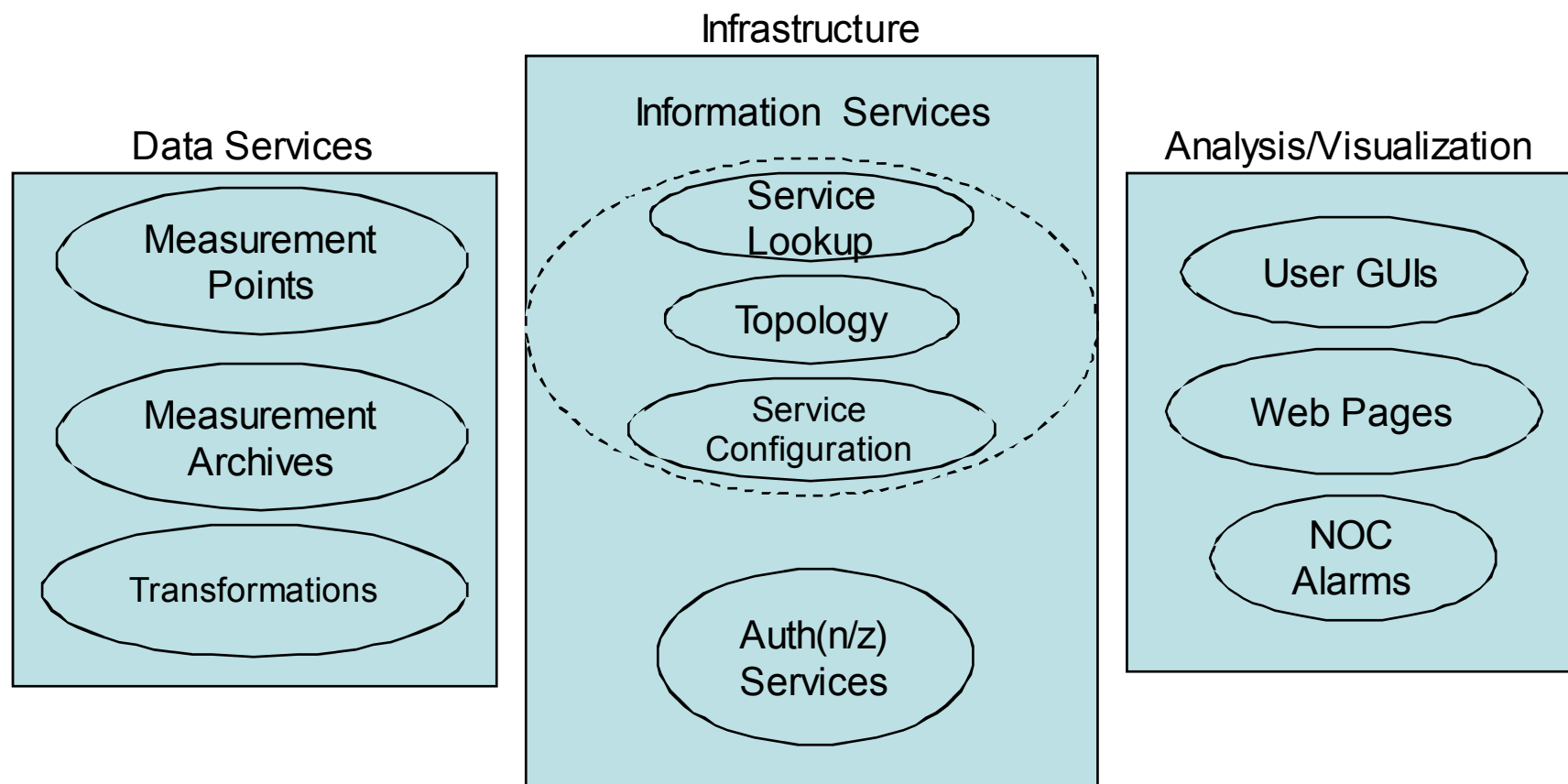
- ◆ 利用兩種管道一起找尋問題
 - 使用診斷工具發現本機問題
 - 可監控網路Latency、網路可用頻寬等資訊
 - 可簡易判斷本機可能問題
 - 定期的監控
 - 透過定期監控建立效能基準點
 - 長時間觀察網路品質及趨勢
- ◆ 與其他單位一起合作
 - 大家共同參與監控
 - 跨網路之監控
 - 大家互相分享量測數據

What is perfSONAR ?

perfSONAR介紹

- ◆ Performance focused Service Oriented Network monitoring ARchitecture
- ◆ perfSONAR 是一個可跨網域之網路效能監控平台，使得能更簡單的解決跨不同網域間之點對點網路問題.
- ◆ 在一個聯盟化的環境下，利用多種不同的Services來做為效能量測之用
- ◆ On-demand的效能量測系統
- ◆ 根據共通的標準(OGF NM-WG)，可自行開發所需程式
- ◆ 大家可互相分享資料
- ◆ Implementation
 - perfSONAR-PS (developed by US)
 - perfSONAR-MDM (developed by EU)

perfSONAR Architecture Overview



perfSONAR Toolkit

- ◆ Live-CD disk
- ◆ 包含了BWCTL, OWAMP, NDT, NPAD, Pinger, Traceroute, Reverse CGIs等工具
- ◆ 目前穩定版本:pS-Performance Toolkit 3.2.2
- ◆ 3.3 RC2亦已發行
- ◆ 其他安裝：
 - Apache2 - Web server with supporting modules and extensions
 - MySQL - Relational database management system
 - NTP - Network Time Protocol(重要)
 - Oracle DB XML - XML Database

NDT介紹

- ◆ NDT (Network Diagnostic Tool) 是一 Client/Server 架構的測試工具，
- ◆ 包含Client端的 JAVA Applet與Server端的Web Server及 Testing/Analysis Engine，用來快速、簡易的鑑別出網路效能以及瓶頸點
- ◆ 可給予適當的建議，經由Multi-Level Report的機制，提供了不同詳細程度的回報，讓各種使用者能有效率的獲得所需資訊

BWCTL介紹

- ◆ BWCTL(Bandwidth Control)是以Iperf為開發基礎的一套 client-server應用程式
- ◆ 運用排程的方式來達到網路頻寬的正確量測
- ◆ 能夠藉由各種參數的調校，來量測目前TCP、UDP bandwidth、Jitter、delay，datagram loss…等
- ◆ 可量測IPv4、IPv6上的TCP/UDP…等網路頻寬效能量測

修改TCP Buffer size

```
net.core.rmem_max = 33554432
```

```
net.core.wmem_max = 33554432
```

```
net.ipv4.tcp_rmem = 4096 87380 16777216
```

```
net.ipv4.tcp_wmem = 4096 87380 16777216
```

```
net.core.netdev_max_backlog = 30000
```

```
net.ipv4.tcp_no_metrics_save = 1
```

```
net.ipv4.tcp_congestion_control = htcp
```


建置方法

系統要求

- ◆ CPU :
 - Single Core CPU: 2.6 GHz or better
 - Dual Core CPU: 1.8 GHz or better
- ◆ The minimum amount of system memory is 2GB.
- ◆ 500GB of disk memory is recommended
- ◆ Network Interface Cards : 速度為1Gbps以上或10Gpbs之網卡，建議使用非on-board的網卡
- ◆ 安裝媒介：
 - Netinstall CD(建議)
 - Live CD
- ◆ 不建議使用VM系統來裝

Firewall Ports

Service	Protocol	Local Ports	Direction	Service	Protocol	Local Ports	Direction
SNMP MA	TCP	8065	Incoming	OWAMP	TCP	861	Incoming/Outgoing
		9990			UDP	8760-8960	
Traceroute MA	TCP (control), TCP/UDP/ICMP (measurement)	8086	Incoming/Outgoing	NDT	TCP	3001-3003	Incoming/Outgoing
		8087				7123	Incoming
PingER	TCP (control), ICMP (measurement)	8075	incoming (control), outgoing (measurement)	NPAD	TCP	8000	Incoming
perfSONAR-BUOY	TCP	8085	Incoming			8001-8020	Incoming/Outgoing
		8569	Incoming/Outgoing	Apache	TCP	80	Incoming
		8570				443	
Lookup Service	TCP	8090	Incoming/Outgoing	SSH (Optional)	TCP	22	Incoming
		8095		NTP	UDP	123	Outgoing
		9995		DNS	UDP	53	Outgoing
BWCTL	TCP	4823	Incoming/Outgoing	Ping	ICMP	-	Incoming/Outgoing
	TCP/UDP TCP/UDP	6001-6200		Echo	TCP	7	Incoming
		5001-5600		Ping	ICMP	33434-33534	Incoming

perfSONAR Toolkit安裝畫面

詳如Appendix

設定方法

(例如 <https://211.79.59.90/toolkit>)

perfSONAR toolkit首頁

← → ↻ 🏠 211.79.54.18/toolkit/

User Tools
 Local Performance Services
 Global Performance Services
 Java OWAMP Client
 Reverse Traceroute
 Reverse Ping

Service Graphs
 Throughput
 One-Way Latency
 Ping Latency
 SNMP Utilization
 Cacti Graphs

Toolkit Administration
Administrative Information
 External BWCTL Limits
 External OWAMP Limits
 Enabled Services
 NTP
 Scheduled Tests
 Cacti SNMP Monitoring
 perfSONAR Logs

Performance Toolkit
 Configuration Help
 Frequently Asked Questions
 About
 Credits

pS-Performance Node For TWAREN_NCHU in Taichung, Taiwan

Host Information	
Organization Name	TWAREN_NCHU
Host Location	Taichung, Taiwan
Administrator Name	yangcn
Administrator Email	yangcn@nchc.narl.org.tw

Communities This Host Participates In

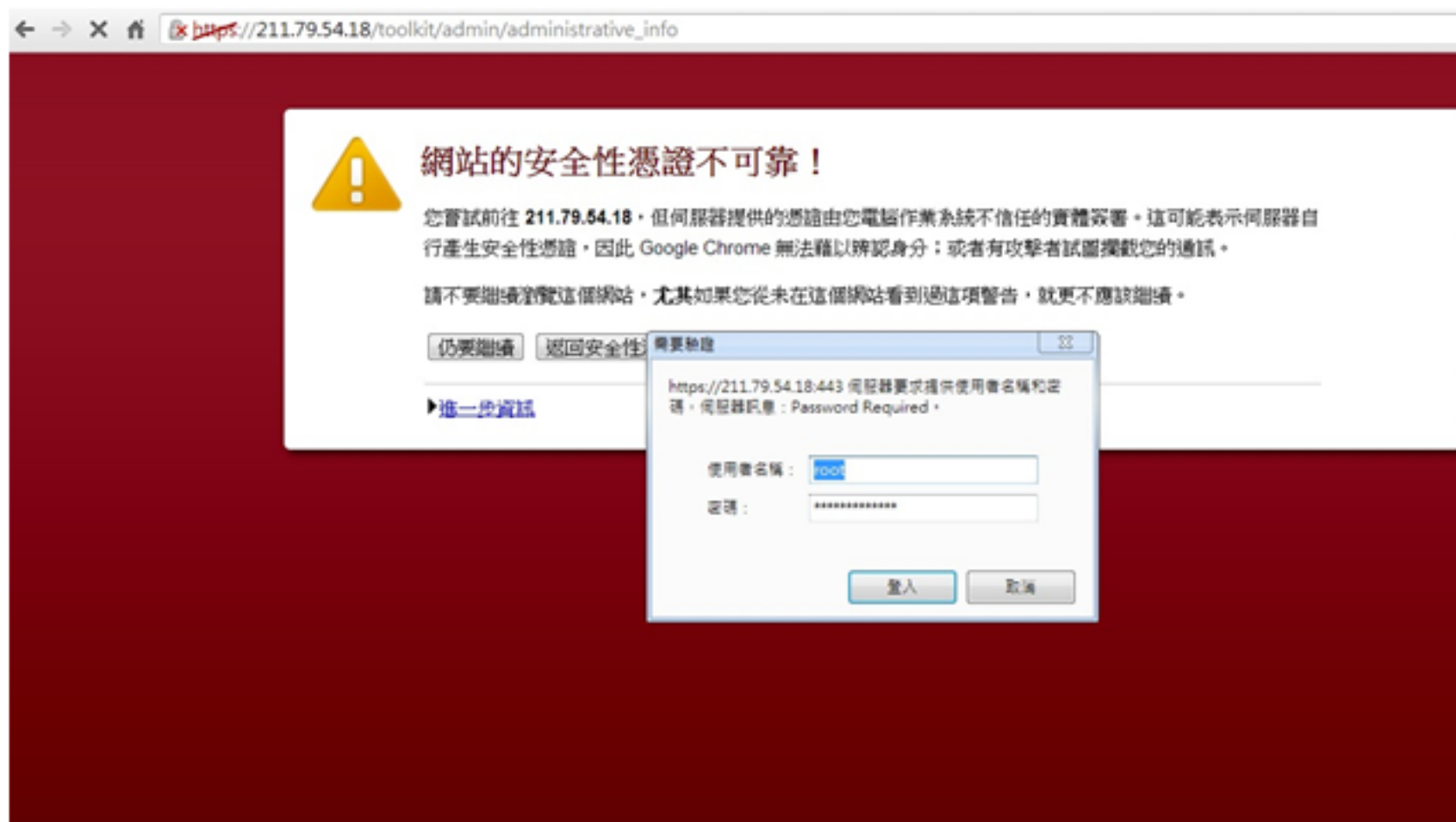
TWAREN

Host Status	
Primary Address	nchum.twaren.net
MTU	1500
NTP Status	Synced
Globally registered	Yes

Services Offered	
Bandwidth Test Controller (BWCTL) • tcp://211.79.54.18:4823 • tcp://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:4823	Disabled
Lookup Service • http://211.79.54.18:9995/perfSONAR_PS/services/hLS • http://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:9995/perfSONAR_PS/services/hLS	Running
Network Diagnostic Tester (NDT) • tcp://211.79.54.18:3001 • http://211.79.54.18:7123 • tcp://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:3001 • http://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:7123	Running
Network Path and Application Diagnosis (NPAD) • tcp://211.79.54.18:8001 • http://211.79.54.18:8000 • tcp://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:8001 • http://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:8000	Disabled
One-Way Ping Service (OWAMP) • tcp://211.79.54.18:861 • tcp://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:861	Disabled
perfSONAR-BUOY Regular Testing (Throughput)	Disabled
perfSONAR-BUOY Measurement Archive • http://211.79.54.18:8085/perfSONAR_PS/services/pSB • http://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:8085/perfSONAR_PS/services/pSB	Running


perfSONAR powered

輸入root帳號



基本資料設定

← → ↻ 🔍 https://211.79.54.18/toolkit/admin/administrative_info/#



User Tools

- Local Performance Services
- Global Performance Services
- Java OWAMP Client
- Reverse Traceroute
- Reverse Ping

Service Graphs

- Throughput
- One-Way Latency
- Ping Latency
- SNMP Utilization
- Cacti Graphs

Toolkit Administration

- Administrative Information
- External BWCTL Limits
- External OWAMP Limits
- Enabled Services
- NTP
- Scheduled Tests
- Cacti SNMP Monitoring
- perSONAR Logs

Performance Toolkit

Administrative Information Configuration Tool

Save Reset

Host Information		Edit
Organization Name	TWAREN_NCHU	
Host Location	Taichung, Taiwan	
Administrator Name	yangcn	
Administrator Email	yangcn@nchc.narl.org.tw	

Communities^[1] This Host Participates In

Community	Delete
TWAREN	

[Add new Community](#)

Popular Communities As Of 2013-04-29 12:58 (Click To Join)

[123 AARNet](#) [ACORN](#) [Actipvs](#) [AGLT2](#) [AIST](#) [ALICE](#) [Ames Lab](#) [Ames Lab Int](#) [APAN-IP](#) [AREON](#) [ASUNet](#) [ATALAS](#) [Atlas](#) [ATLAS](#) [ATLASIT](#) [Atmospheric](#) [au](#)
[Claremont Colleges](#) [Climate HPC](#) [CMS](#) [CNRS](#) [ComputeCanada](#) [Connecticut Education Network](#) [ConnecticutEducationNetwork](#) [Cybera](#) [DES](#) [DOE S](#)
[Florida LambdaRail](#) [frgp](#) [FRGP](#) [Funet](#) [GAMMON](#) [GEANT](#) [geant](#) [Georgia.Tech](#) [GIGA](#) [GISELA](#) [GLIF](#) [GLIF Automated](#) [GOLE Project](#) [GPN](#) [GreenSONAR](#) [GridF](#)
[HFCAS](#) [i2Commons](#) [ICCN](#) [IGTMD](#) [IllinoisNet](#) [IN2P3](#) [INFN](#) [Internet 2](#) [internet2](#) [Internet2](#) [Internet2_CTP](#) [IGN-X](#) [IGN2Plus](#) [Inu_NCL](#) [KanREN](#) [KDI](#) [KOR](#)
[Nettos](#) [LSU Main-Campus](#) [MaineREN](#) [MAX](#) [MCNC](#) [MDM](#) [mdm](#) [Mediciones-CEDIA](#) [Merit](#) [MilB](#) [MBEN](#) [MSuperTest](#) [MWT2](#) [mybwcti](#) [mycommunity](#) [I](#)
[NORDUnet](#) [Northern-Lights](#) [NOX](#) [NRC-CNRC](#) [NRC-SPAI-GE](#) [NRNet-II](#) [NRNet-II](#) [QF](#) [Tein](#) [OmniPOP](#) [OneNet](#) [ORAU](#) [Oregon Gigapop](#) [OSHEAN](#) [Peenn](#) [I](#)
[College POP-SC](#) [PoP-SC](#) [PoP-SC/RNP](#) [p5-NPToolkit-3.2](#) [p5-NPToolkit-3.2.1](#) [p5-NPToolkit-3.2.2](#) [p5-NPToolkit-](#)
[Sailor](#) [SANREN](#) [SC08](#) [SC10](#) [SCinet](#) [sdc-hosting](#) [SDSC](#) [SDSC-Colo](#) [Sercomtel Server](#) [SHI](#) [SINP](#) [SOX](#) [StarLight](#) [SUNET](#) [TEST](#) [ThaiREN](#) [TLPW](#) [TransPAC](#) [tudp](#)
[University of Alaska](#) [University of Minnesota](#) [University of Oregon](#) [upenn](#) [UPB](#) [USATLAS](#) [USCMS](#) [USLHCNET](#) [USPnet](#) [SONAR](#) [UT_Aust](#)

Save Reset

Pinger設定畫面

← → ↻ 🏠 211.79.54.18/toolkit/

User Tools

- Local Performance Services
- Global Performance Services
- Java OWAMP Client
- Reverse Traceroute
- Reverse Ping

Service Graphs

- Throughput
- One-Way Latency
- Ping Latency
- SNMP Utilization
- Cacti Graphs

Toolkit Administration

- Administrative Information
- External BWCTL Limits
- External OWAMP Limits
- Enabled Services
- NTP**
- Scheduled Tests
- Cacti SNMP Monitoring
- perfSONAR Logs

Performance Toolkit

- Configuration Help
- Frequently Asked Questions
- About
- Credits

pS-Performance Node For TWAREN_NCHU in Taichung, Taiwan

Host Information	
Organization Name	TWAREN_NCHU
Host Location	Taichung, Taiwan
Administrator Name	yangcn
Administrator Email	yangcn@nchc.narl.org.tw

Communities This Host Participates In	
TWAREN	

Host Status	
Primary Address	nchum.twaren.net
MTU	1500
NTP Status	Synced
Globally registered	Yes

Services Offered	
Bandwidth Test Controller (BWCTL)	Disabled
<ul style="list-style-type: none"> tcp://211.79.54.18:4823 tcp://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:4823 	
Lookup Service	Running
<ul style="list-style-type: none"> http://211.79.54.18:9995/perfSONAR_PS/services/hLS http://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:9995/perfSONAR_PS/services/hLS 	
Network Diagnostic Tester (NDT)	Running
<ul style="list-style-type: none"> tcp://211.79.54.18:3001 http://211.79.54.18:7123 tcp://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:3001 http://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:7123 	
Network Path and Application Diagnosis (NPAD)	Disabled
<ul style="list-style-type: none"> tcp://211.79.54.18:8001 http://211.79.54.18:8000 tcp://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:8001 http://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:8000 	
One-Way Ping Service (OWAMP)	Disabled
<ul style="list-style-type: none"> tcp://211.79.54.18:861 tcp://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:861 	
perfSONAR-BUOY Regular Testing (Throughput)	Disabled
perfSONAR-BUOY Measurement Archive	Running
<ul style="list-style-type: none"> http://211.79.54.18:8085/perfSONAR_PS/services/pSB http://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:8085/perfSONAR_PS/services/pSB 	

perfSONAR
powered

Pinger設定畫面

← → ↻ 🏠 https://211.79.59.90/toolkit/admin/regular_testing/

User Tools

- Local Performance Services
- Global Performance Services
- Java OWAMP Client
- Reverse Traceroute
- Reverse Ping

Service Graphs

- Throughput
- One-Way Latency
- Ping Latency
- SNMP Utilization
- Cacti Graphs

Scheduled Tests Configuration Tool

This host is configured with both latency and bandwidth tests. Bandwidth tests can interfere with latency tests

Throughput tests will be running 1% of the time

Scheduled Tests		
TP_Bwctl	Throughput Test	Configure Delete
TP_Ping	Ping Test	Configure Delete

Pinger新增host畫面

User Tools

Local Performance Services

Global Performance Services

Java OWAMP Client

Reverse Traceroute

Reverse Ping

Service Graphs

Throughput

One-Way Latency

Ping Latency

SNMP Utilization

Cacti Graphs

Toolkit Administration

Administrative Information

External BWCTL Limits

External OWAMP Limits

Enabled Services

NTP

Scheduled Tests

Cacti SNMP Monitoring

perfsONAR Logs

Performance Toolkit

Configuration Help

Frequently Asked Questions

About

Credits

Scheduled Tests

ps_trace	Traceroute Test	Configure Delete
ps_owamp	One-Way Delay Test	Configure Delete
ps_ping	Ping Test	Configure Delete

[Add New Throughput Test](#)
[Add New Ping Test](#)
[Add New One-Way Delay Test](#)
[Add New Traceroute Test](#)

Configure OWAMP Tests Port Range

Test Parameters

Description	ps_ping
Time Between Tests (seconds)	300
Packets Sent Per Test	10
Time Between Packets (seconds)	1
Size Of Test Packets	1000

[Edit Test Parameters](#)

Test Members

211.79.58.18	msysum.twaren.net	Delete
211.79.61.148	211.79.61.148	Delete
211.79.52.18	nthum.twaren.net	Delete
211.79.48.10	asccm.twaren.net	Delete
211.79.60.138	tcu.twaren.net	Delete
211.79.63.82	trm.twaren.net	Delete
211.79.51.18	ncum.twaren.net	Delete
211.79.57.18	ccum.twaren.net	Delete
211.79.53.18	ncum.twaren.net	Delete
211.79.50.162	nium.twaren.net	Delete
211.79.63.66	hcm.twaren.net	Delete
211.79.49.18	ntum.twaren.net	Delete
211.79.59.90	tpm.twaren.net	Delete
211.79.54.18	nchum.twaren.net	Delete
211.79.56.18	ncum.twaren.net	Delete
211.79.50.18	ndhum.twaren.net	Delete
211.79.55.18	ncum.twaren.net	Delete

Add New Host

Find Hosts To Test With

Members Of TWAREN Community As Of 2013-04-29 09:36

Ping Responder at TWAREN Lab in Hsinchu, Taiwan	Add To Test
2001:e10:3c00:2:211:25ff:fe2b:62af	Add To Test
Ping Responder at NCHC_LAB in Hsinchu, Taiwan	Add To Test
140.110.209.160	Add To Test
Ping Responder at NCHC_LAB in Hsinchu, Taiwan	Add To Test
2001:e10:2000:d1:21e:bff:fe4b:be3e	Add To Test


Communities This Host Participates In (Click To Find Community Hosts)

NCHC

perfsONAR
powered

Pinger查詢畫面

← → C N 211.79.59.90/toolkit/gui/perfAdmin/serviceTest.cgi?url=http://localhost:8075/perfSONAR_PS/services/pinger/ma&eventType=http://ggf.org/ns/nmwg/tools/pinger/2.0/



User Tools
 Local Performance Services
 Global Performance Services
 Java OWAMP Client
 Reverse Traceroute
 Reverse Ping

Service Graphs
 Throughput
 One-Way Latency
Ping Latency
 SNMP Utilization
 Cacti Graphs

Toolkit Administration
 Administrative Information
 External BWCTL Limits
 External OWAMP Limits
 Enabled Services
 NTP
 Scheduled Tests
 Cacti SNMP Monitoring
 perfSONAR Logs

Pinger Tests

Active Data Sets				
Source Address	Source Host	Destination Address	Destination Host	Graph
211.79.59.90	tpm.twaren.net	211.79.48.10	asccm.twaren.net	-- Select --
211.79.59.90	tpm.twaren.net	211.79.49.18	ntum.twaren.net	-- Select --
211.79.59.90	tpm.twaren.net	211.79.50.162	nium.twaren.net	-- Select --
211.79.59.90	tpm.twaren.net	211.79.50.18	ndhum.twaren.net	-- Select --
211.79.59.90	tpm.twaren.net	211.79.51.18	ncum.twaren.net	-- Select --
211.79.59.90	tpm.twaren.net	211.79.52.18	nthum.twaren.net	-- Select --
211.79.59.90	tpm.twaren.net	211.79.53.18	nctum.twaren.net	-- Select --
211.79.59.90	tpm.twaren.net	211.79.54.18	nchum.twaren.net	-- Select --
211.79.59.90	tpm.twaren.net	211.79.55.18	ncum.twaren.net	-- Select --
211.79.59.90	tpm.twaren.net	211.79.56.18	ncum.twaren.net	-- Select --
211.79.59.90	tpm.twaren.net	211.79.57.18	ccum.twaren.net	-- Select --
211.79.59.90	tpm.twaren.net	211.79.58.18	msysum.twaren.net	-- Select --
211.79.59.90	tpm.twaren.net	211.79.60.138	tcum.twaren.net	-- Select --
211.79.59.90	tpm.twaren.net	211.79.63.66	hcm.twaren.net	-- Select --
211.79.59.90	tpm.twaren.net	211.79.63.82	tnm.twaren.net	-- Select --

Non-Active Data Sets				
Source Address	Source Host	Destination Address	Destination Host	Graph
				-- Select --
				12 Hours
				24 Hours
				48 Hours

Pinger查詢顯示畫面

← → ↺ ⌂ 211.79.58.18/toolkit/gui/perfAdmin/PingERGraph.cgi?url=http://localhost:8075/perfSONAR_PS/services/pinger/ma&key=6&l

Source: nsysum.twaren.net (211.79.58.18) -- Destination: tnm.twaren.net (211.79.63.82)



BWCTL查詢畫面

← → ↻ 🏠 211.79.54.18/toolkit/

User Tools

- Local Performance Services
- Global Performance Services
- Java OWAMP Client
- Reverse Traceroute
- Reverse Ping

Service Graphs

- Throughput
- One-Way Latency
- Ping Latency
- SNMP Utilization
- Cacti Graphs

Toolkit Administration

- Administrative Information
- External BWCTL Limits
- External OWAMP Limits
- Enabled Services
- NTP
- Scheduled Tests
- Cacti SNMP Monitoring
- perfSONAR Logs

Performance Toolkit

- Configuration Help
- Frequently Asked Questions
- About
- Credits

perfSONAR powered

pS-Performance Node For TWAREN_NCHU in Taichung, Taiwan

Host Information	
Organization Name	TWAREN_NCHU
Host Location	Taichung, Taiwan
Administrator Name	yangcn
Administrator Email	yangcn@nchc.narl.org.tw


Communities This Host Participates In	
TWAREN	

Host Status	
Primary Address	nchum.twaren.net
MTU	1500
NTP Status	Synced
Globally registered	Yes

Services Offered	
Bandwidth Test Controller (BWCTL)	Disabled
<ul style="list-style-type: none"> tcp://211.79.54.18:4823 tcp://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:4823 	
Lookup Service	Running
<ul style="list-style-type: none"> http://211.79.54.18:9995/perfSONAR_PS/services/hLS http://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:9995/perfSONAR_PS/services/hLS 	
Network Diagnostic Tester (NDT)	Running
<ul style="list-style-type: none"> tcp://211.79.54.18:3001 http://211.79.54.18:7123 tcp://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:3001 http://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:7123 	
Network Path and Application Diagnosis (NPAD)	Disabled
<ul style="list-style-type: none"> tcp://211.79.54.18:8001 http://211.79.54.18:8000 tcp://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:8001 http://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:8000 	
One-Way Ping Service (OWAMP)	Disabled
<ul style="list-style-type: none"> tcp://211.79.54.18:861 tcp://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:861 	
perfSONAR-BUOY Regular Testing (Throughput)	Disabled
perfSONAR-BUOY Measurement Archive	Running
<ul style="list-style-type: none"> http://211.79.54.18:8085/perfSONAR_PS/services/pSB http://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:8085/perfSONAR_PS/services/pSB 	

BWCTL設定畫面

← → ↻ 🏠 https://211.79.59.90/toolkit/admin/regular_testing/



User Tools

- Local Performance Services
- Global Performance Services
- Java OWAMP Client
- Reverse Traceroute
- Reverse Ping

Service Graphs

- Throughput
- One-Way Latency
- Ping Latency
- SNMP Utilization
- Cacti Graphs

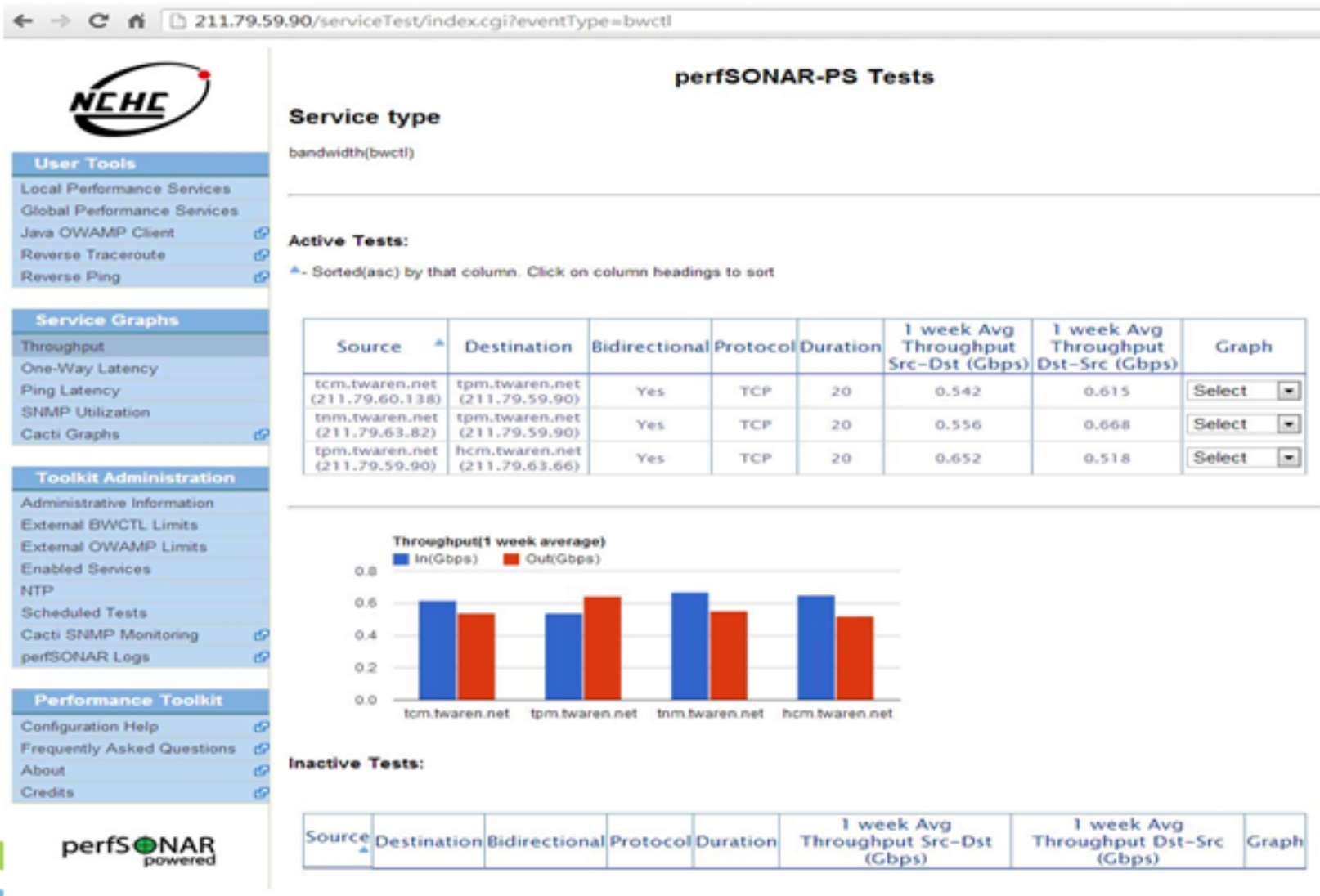
Scheduled Tests Configuration Tool

This host is configured with both latency and bandwidth tests. Bandwidth tests can interfere with latency tests

Throughput tests will be running 1% of the time

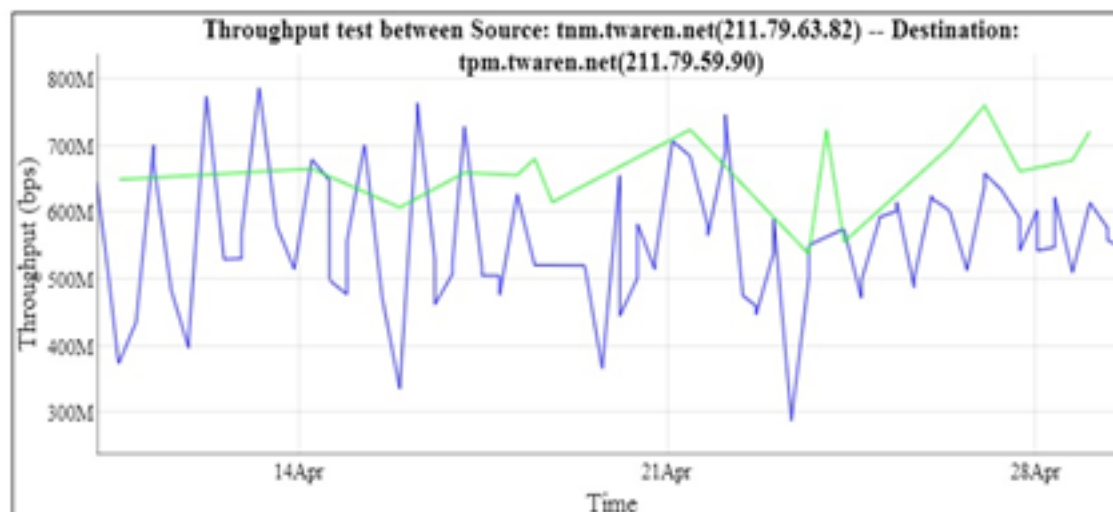
Scheduled Tests		
TP_Bwctl	Throughput Test	Configure Delete
TP_Ping	Ping Test	Configure Delete

BWCTL查詢結果畫面



BWCTL查詢顯示畫面

211.79.59.90/serviceTest/bandwidthGraph.cgi?url=http://localhost:8085/perfSONAR_PS/services/pSB&key=a7311f23998bdcfc7dfc16a88d41cfdc&keyR=b07c405848bfa80442c36432db43a89f&dsdP=211.79.59.90



Graph Key

■ Src-Dst throughput
■ Dst-Src throughput

[<- 1 month](#)

[1 month ->](#)

Timezone: GMT+0800 (台北標準時間)

Direction	Max throughput(bps)	Mean throughput(bps)	Min throughput(bps)
Src-Dst	788.12M	562.49M	288.19M
Dst-Src	760.9M	662.89M	538.41M

[Show/Hide Link](#)

OWAMP查詢畫面

← → ↻ 🏠 211.79.54.18/toolkit/

User Tools

- Local Performance Services
- Global Performance Services
- Java OWAMP Client
- Reverse Traceroute
- Reverse Ping

Service Graphs

- Throughput
- One-Way Latency**
- Ping Latency
- SNMP Utilization
- Cacti Graphs

Toolkit Administration

- Administrative Information
- External BWCTL Limits
- External OWAMP Limits
- Enabled Services
- NTP
- Scheduled Tests
- Cacti SNMP Monitoring
- perfSONAR Logs

Performance Toolkit

- Configuration Help
- Frequently Asked Questions
- About
- Credits

perfSONAR powered

pS-Performance Node For TWAREN_NCHU in Taichung, Taiwan

Host Information	
Organization Name	TWAREN_NCHU
Host Location	Taichung, Taiwan
Administrator Name	yangcn
Administrator Email	yangcn@nchc.narl.org.tw

Communities This Host Participates In

TWAREN

Host Status	
Primary Address	nchum.twaren.net
MTU	1500
NTP Status	Synced
Globally registered	Yes

Services Offered	
Bandwidth Test Controller (BWCTL)	Disabled
<ul style="list-style-type: none"> tcp://211.79.54.18:4823 tcp://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:4823 	
Lookup Service	Running
<ul style="list-style-type: none"> http://211.79.54.18:9995/perfSONAR_PS/services/hLS http://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:9995/perfSONAR_PS/services/hLS 	
Network Diagnostic Tester (NDT)	Running
<ul style="list-style-type: none"> tcp://211.79.54.18:3001 http://211.79.54.18:7123 tcp://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:3001 http://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:7123 	
Network Path and Application Diagnosis (NPAD)	Disabled
<ul style="list-style-type: none"> tcp://211.79.54.18:8001 http://211.79.54.18:8000 tcp://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:8001 http://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:8000 	
One-Way Ping Service (OWAMP)	Disabled
<ul style="list-style-type: none"> tcp://211.79.54.18:861 tcp://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:861 	
perfSONAR-BUOY Regular Testing (Throughput)	Disabled
perfSONAR-BUOY Measurement Archive	Running
<ul style="list-style-type: none"> http://211.79.54.18:8085/perfSONAR_PS/services/pSB http://[2001:e10:ffff:19fe:5054:ff:fe88:8888]:8085/perfSONAR_PS/services/pSB 	

OWAMP查詢畫面

One Way Latency

Active Tests:

▲ - Sorted(asc) by that column. Click on column headings to sort

Source ▲	Destination	Bidirectional	Forward Direction Loss (Past 30 minutes)	Reverse Direction Loss (Past 30 minutes)	Graph
211.79.49.18 (211.79.49.18)	211.79.63.82 (211.79.63.82)	Yes	0.00%	0.00%	Select ▼
211.79.51.18 (211.79.51.18)	211.79.63.82 (211.79.63.82)	Yes	0.00%	0.00%	Select 4 hours 12 hours 1 Day
211.79.54.18 (211.79.54.18)	211.79.63.82 (211.79.63.82)	Yes	0.00%	0.00%	
211.79.55.18 (211.79.55.18)	211.79.63.82 (211.79.63.82)	Yes	0.00%	0.00%	Select ▼
211.79.56.18 (211.79.56.18)	211.79.63.82 (211.79.63.82)	Yes	0.00%	0.00%	Select ▼
211.79.58.18 (211.79.58.18)	211.79.63.82 (211.79.63.82)	Yes	0.00%	0.00%	Select ▼
211.79.63.82 (211.79.63.82)	ma.perfsonar.twaren.net (211.79.63.66)	Yes	0.00%	0.00%	Select ▼

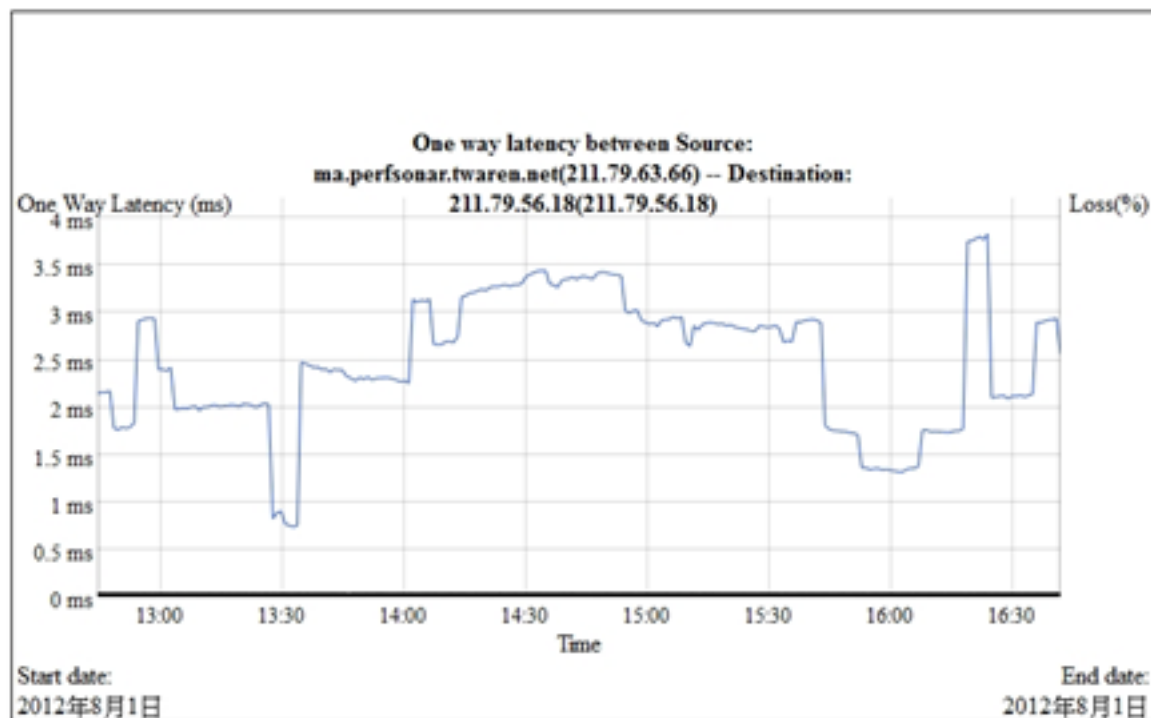
OWAMP查詢顯示畫面

One Way Latency

☒ Scale Y axis from 0 ☐ Show Reverse Direction Data

Graph Key (Src-Dst)

- ☐ Max delay
- ☒ Min delay
- ☒ Loss
- ☐ Third Quartile
- ☐ Median
- ☐ First Quartile



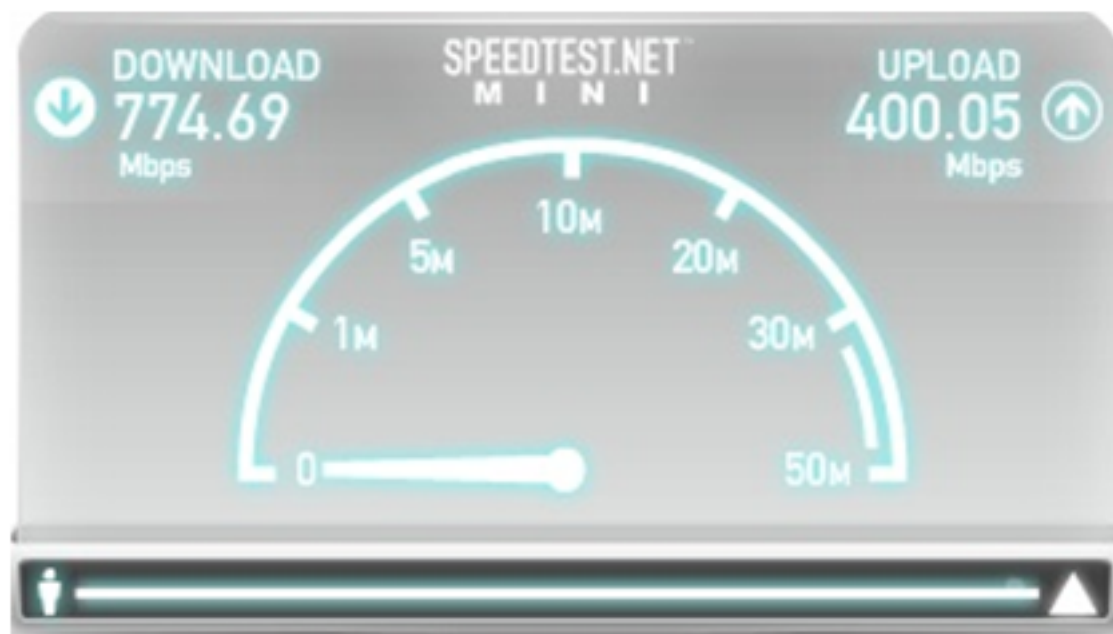
<= 4 hours

Timezone: 16:42:22 GMT+0800

TWARE線上測速系統

Mini Speedtest

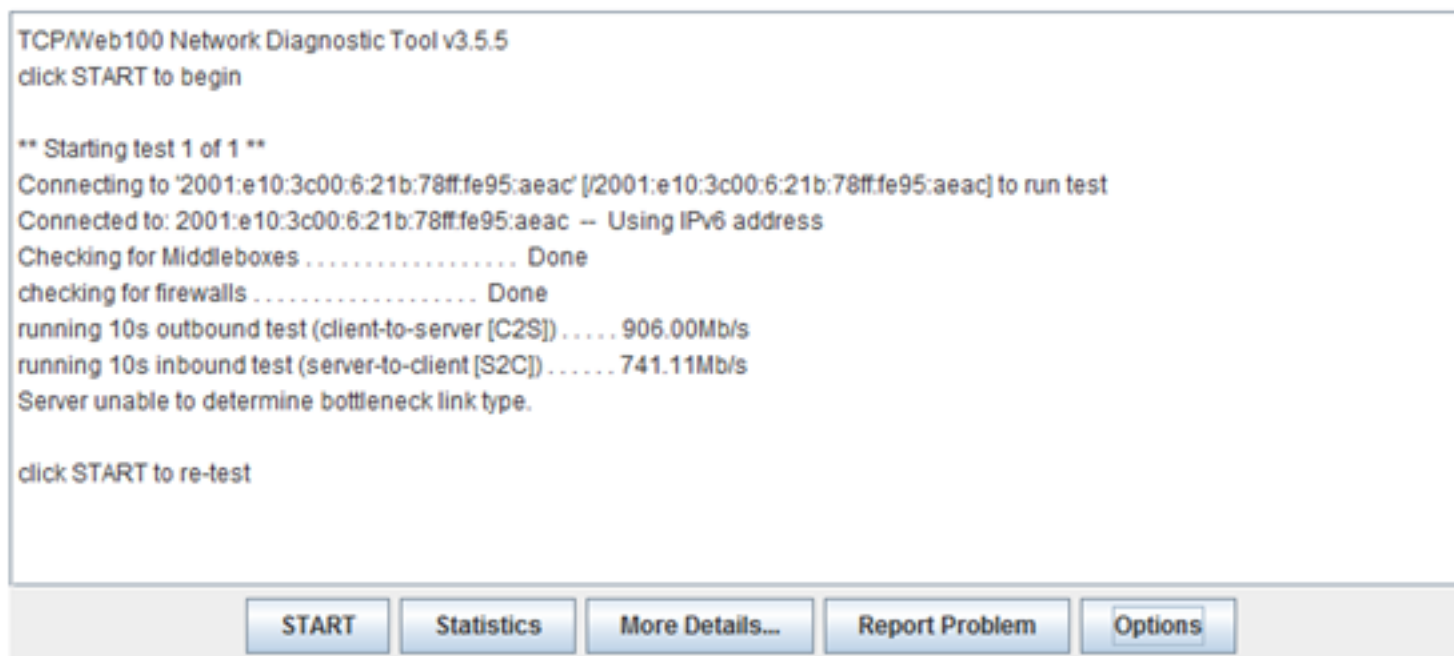
- ◆ <http://speedtest.twaren.net/miniSpeedtest.html>
- ◆ Get from <http://www.speedtest.net/mini.php>



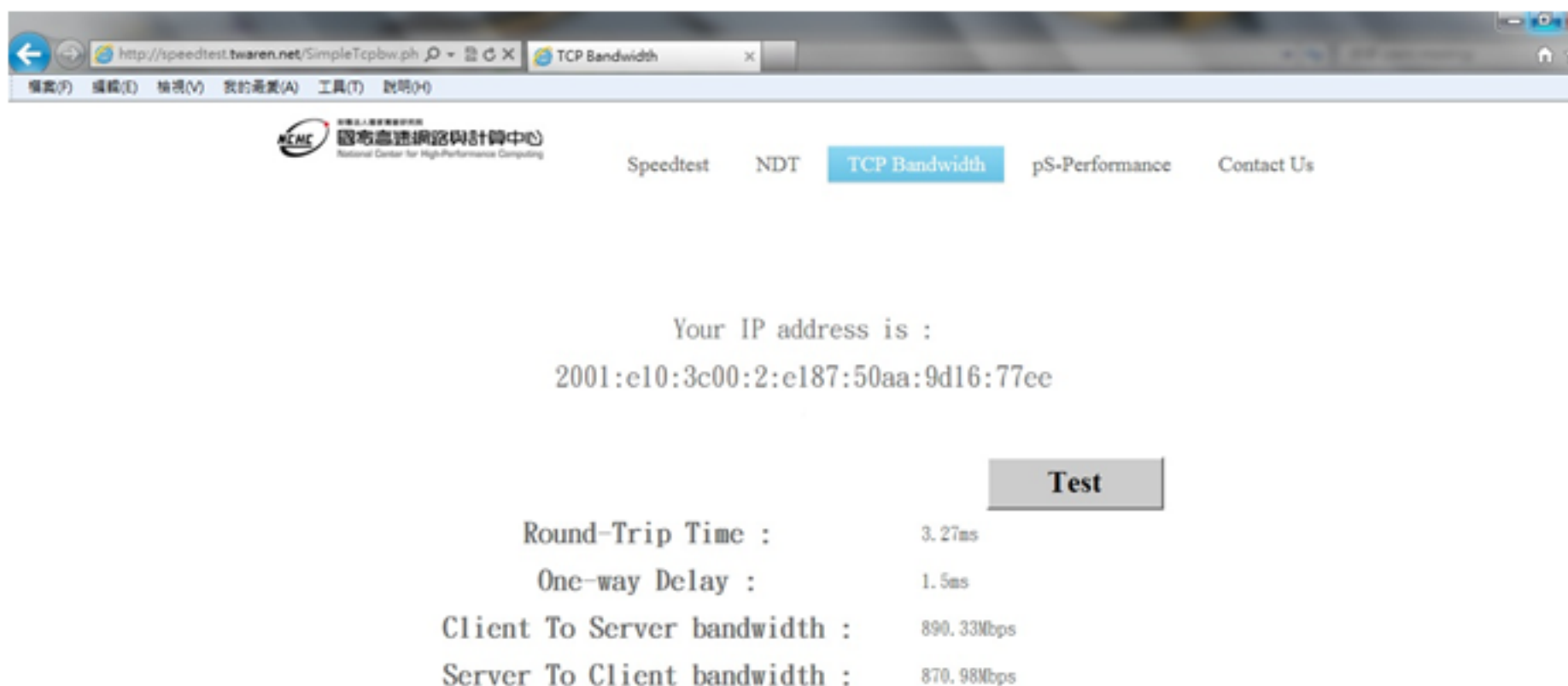
NDT

NDT 測試項目

- ◆ Network Diagnostic Tool(NDT)
 - Result for throughput、RTT、buffer size、Duplex Mismatch



TCP Bandwidth Test



The screenshot shows a web browser window with the URL `http://speedtest.twaren.net/SimpleTcpbw.php`. The page header includes the NCHC logo and navigation links: Speedtest, NDT, TCP Bandwidth (highlighted), pS-Performance, and Contact Us.

The main content area displays the user's IP address: `2001:c10:3c00:2:c187:50aa:9d16:77ce`.

Below the IP address is a **Test** button. The test results are as follows:

Round-Trip Time :	3.27ms
One-way Delay :	1.5ms
Client To Server bandwidth :	890.33Mbps
Server To Client bandwidth :	870.98Mbps

Thank You

Appendix

CD安裝畫面



CD開機畫面

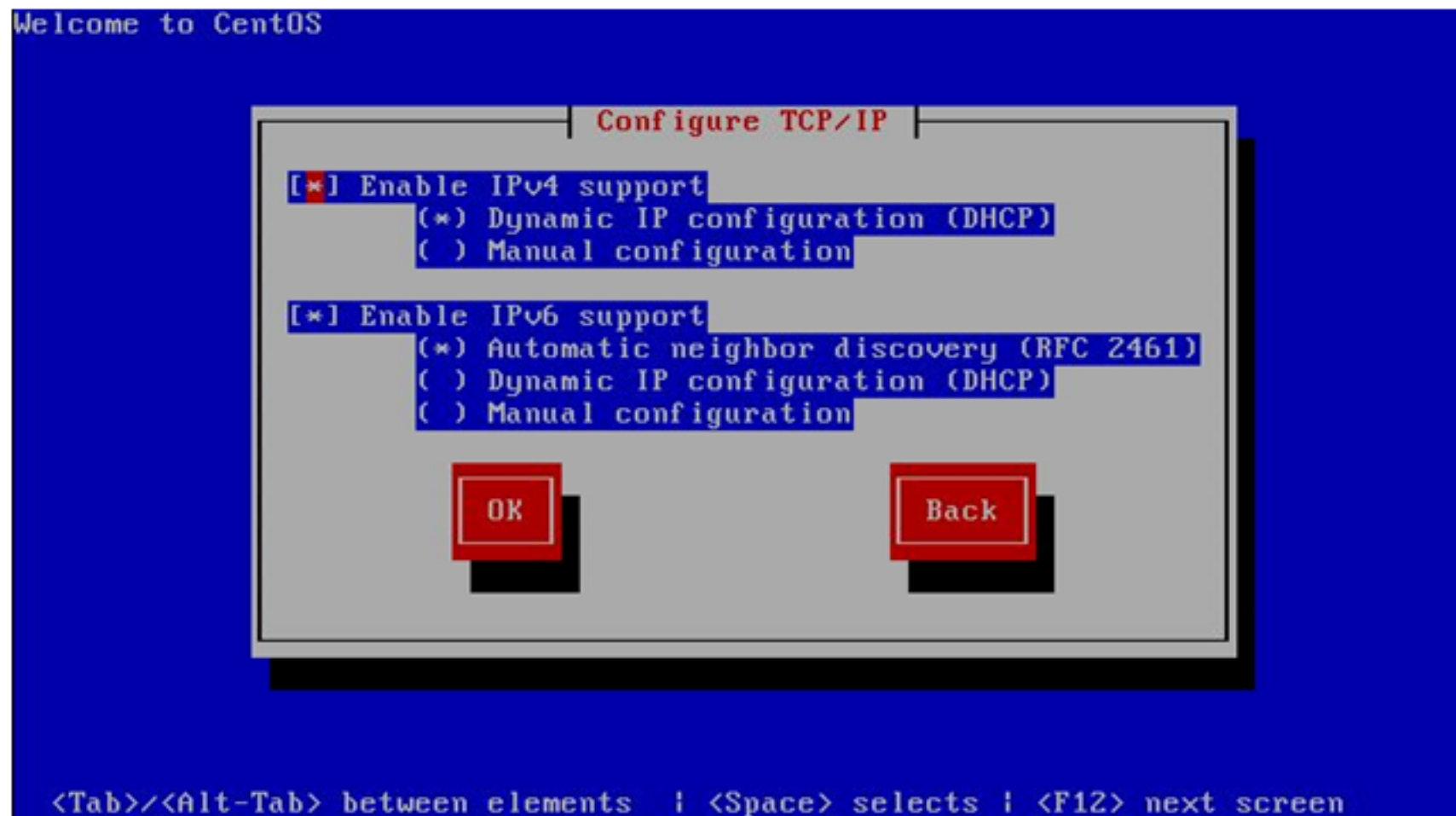
```
md: bitmap version 4.39
TCP bic registered
Initializing IPsec netlink socket
NET: Registered protocol family 1
NET: Registered protocol family 17
Using IPI No-Shortcut mode
Time: tsc clocksource has been installed.
ACPI: (supports S0 S1 S4 S5)
Initializing network drop monitor service
Freeing unused kernel memory: 228k freed
Write protecting the kernel read-only data: 409k

Greetings.
anaconda installer init version 11.1.2.209 starting
mounting /proc filesystem... done
creating /dev filesystem... done
mounting /dev/pts (unix98 pty) filesystem... done
mounting /sys filesystem... done
input: AT Translated Set 2 keyboard as /class/input/input0
input: ImPS/2 Generic Wheel Mouse as /class/input/input1
trying to remount root filesystem read write... done
mounting /tmp as ramfs... done
running install...
running /sbin/loader
```

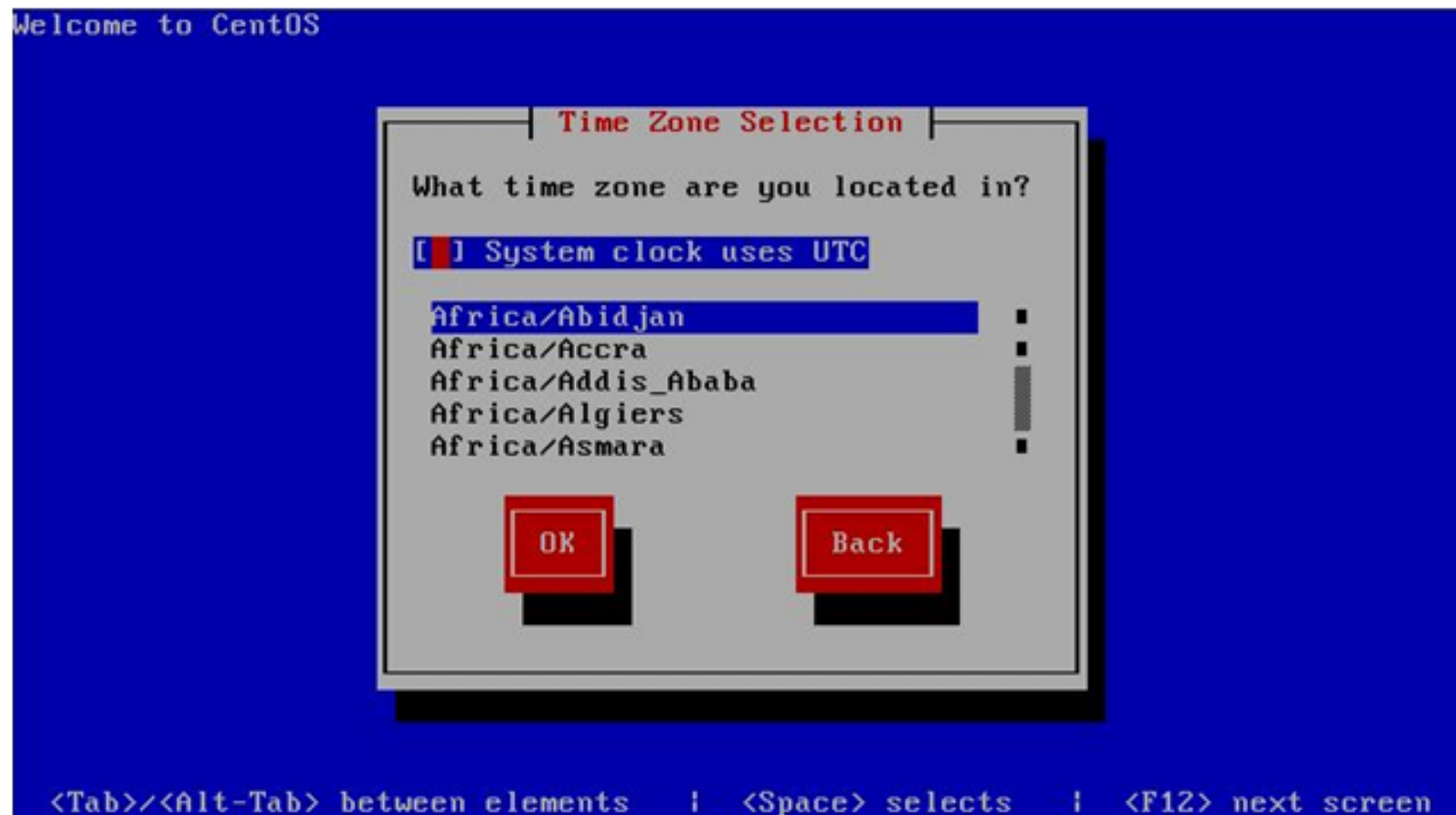
CD開機畫面



IP 設定畫面



時區設定畫面



ROOT密碼設定畫面

Welcome to CentOS

Root Password

Pick a root password. You must type it twice to ensure you know what it is and didn't make a mistake in typing. Remember that the root password is a critical part of system security!

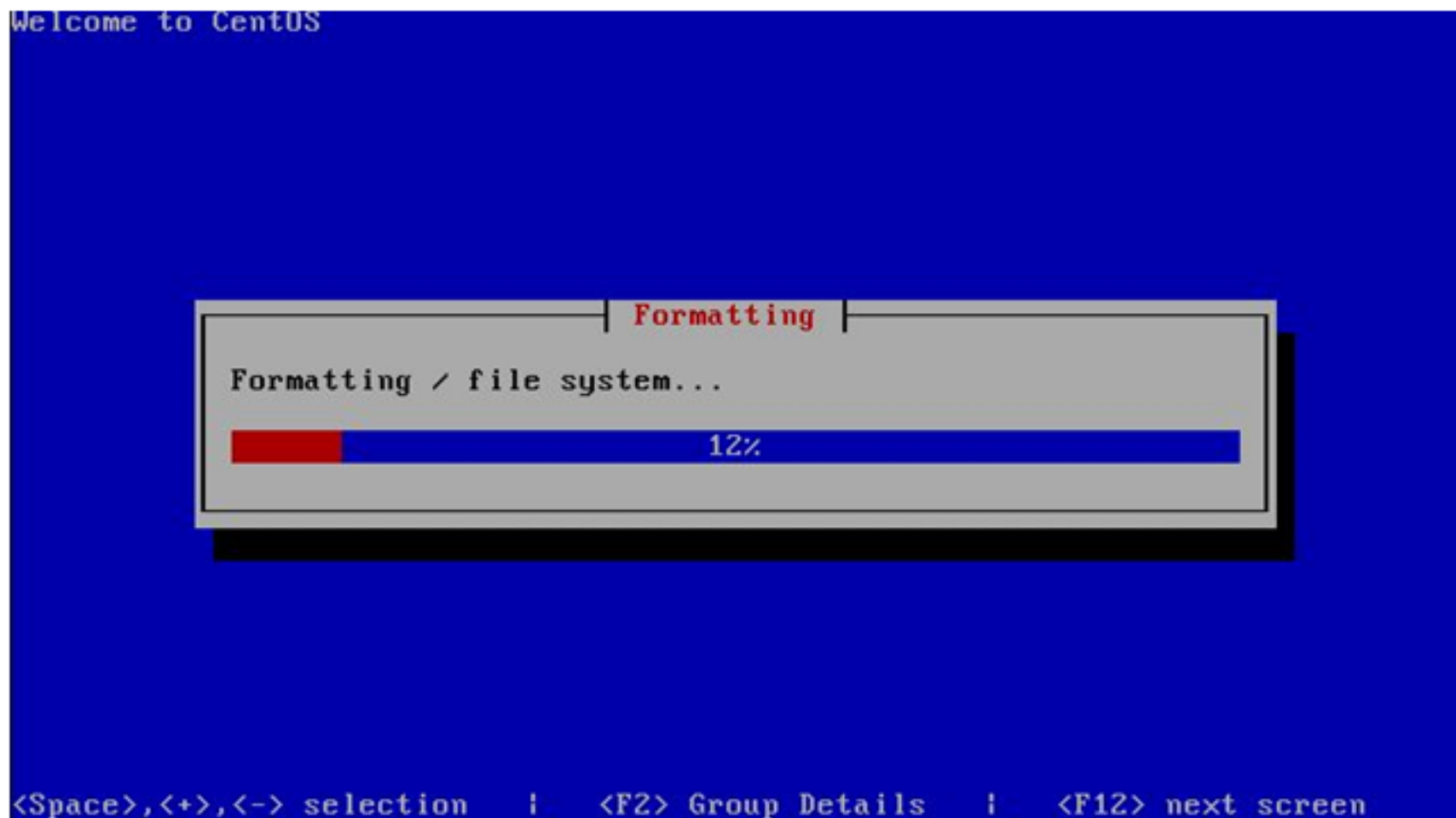
Password:

Password (confirm):

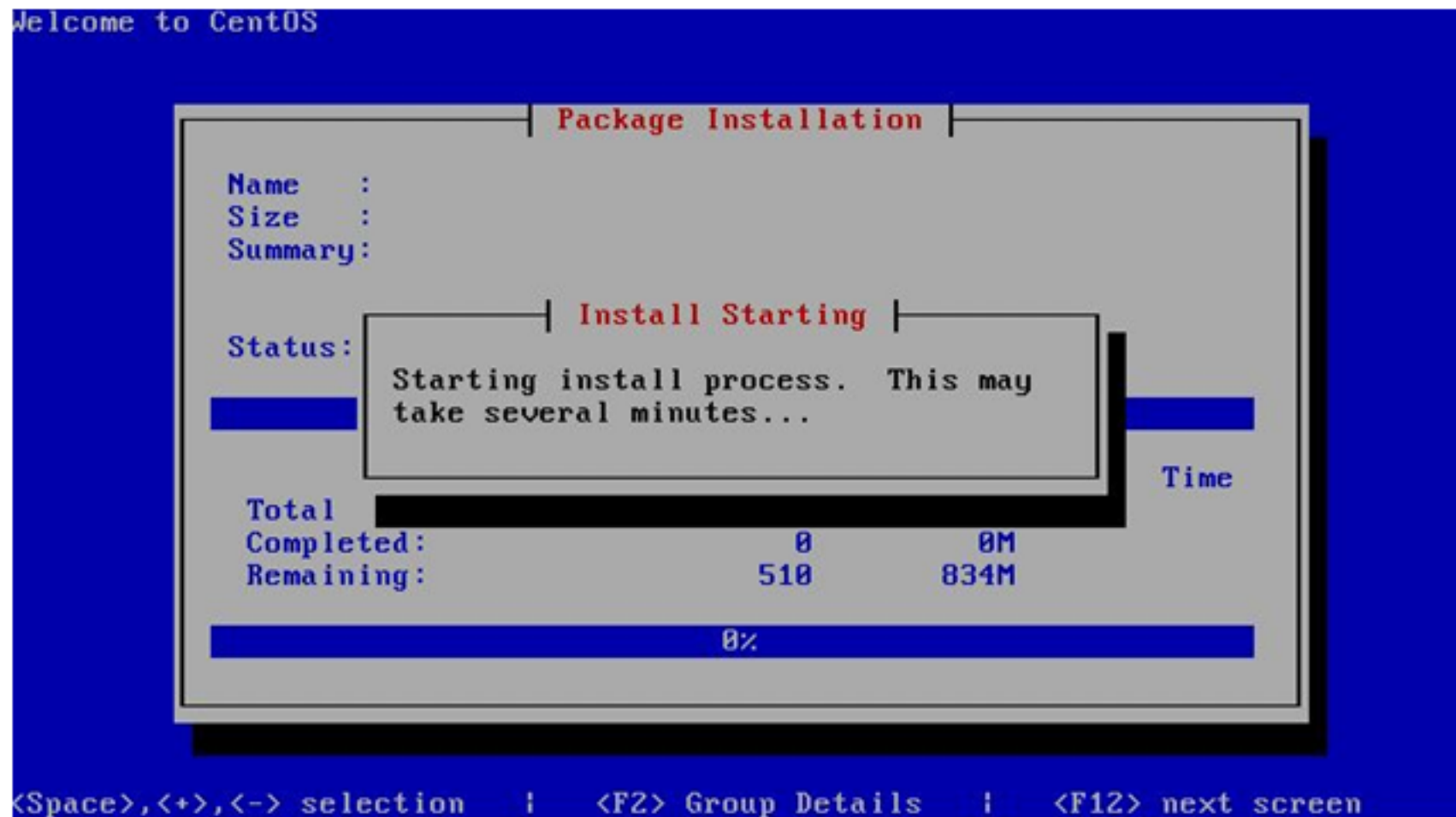
OK
Back

<Tab>/<Alt-Tab> between elements | <Space> selects | <F12> next screen

磁碟格式化畫面



Package安裝畫面



Package安裝畫面

```
Welcome to CentOS
```

Package Installation

Name : glibc-2.5-49.el5_5.6-i686
 Size : 12660k
 Summary: The GNU libc libraries.

Status:

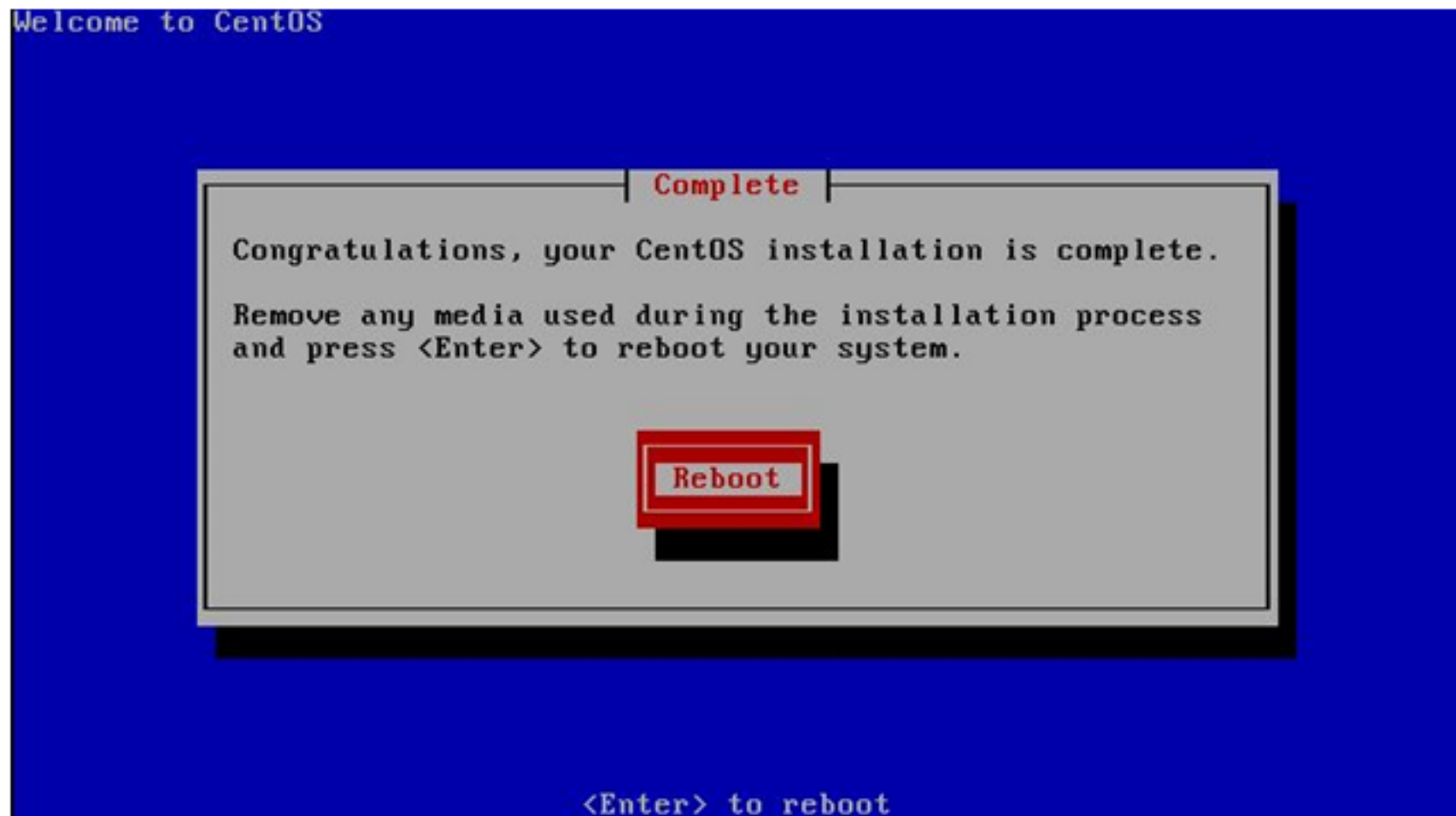
0%

	Packages	Bytes	Time
Total :	510	834M	0:09:31
Completed:	21	112M	0:01:16
Remaining:	489	722M	0:08:14

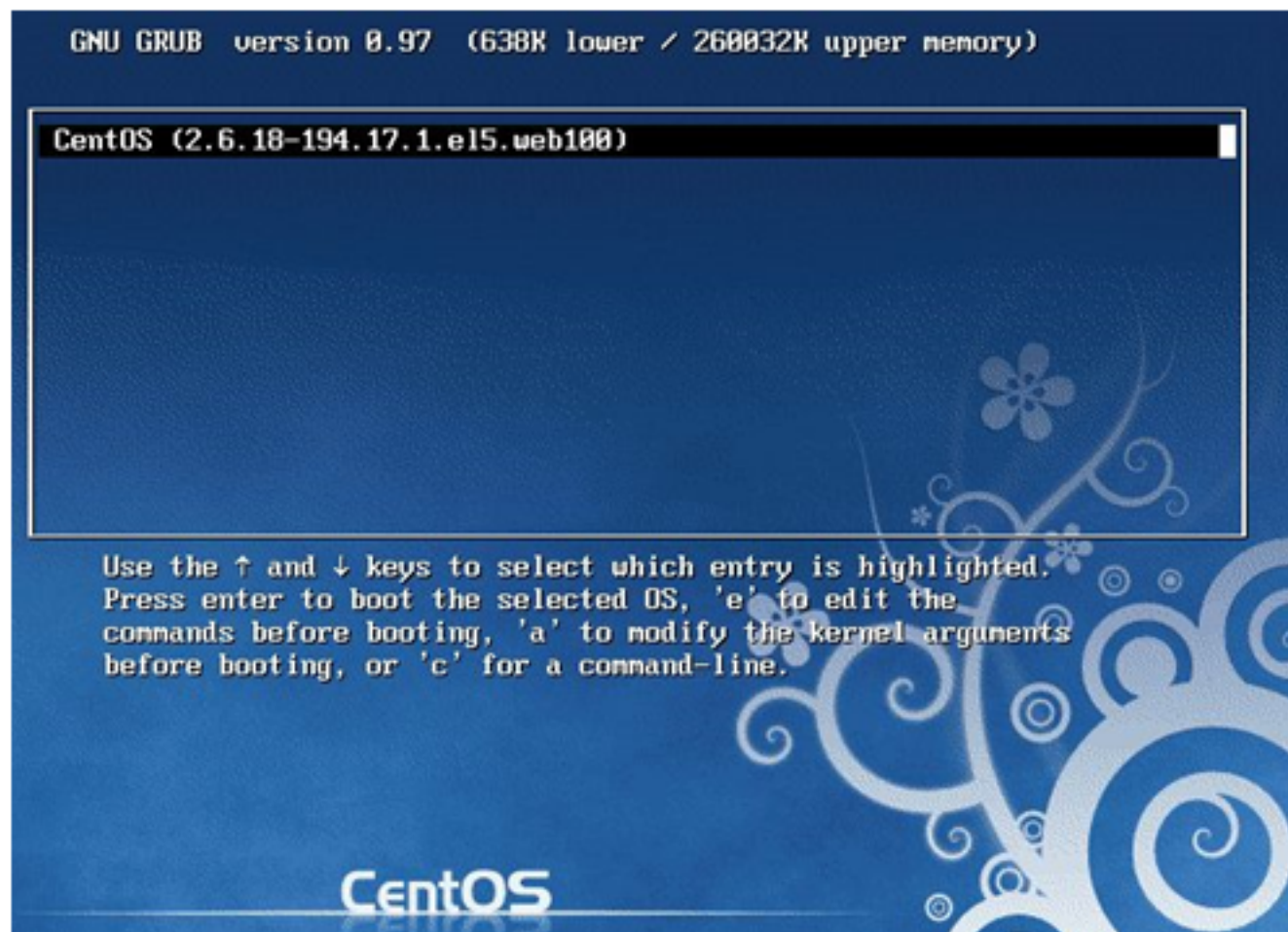
13%

<Space>,<+>,<-> selection | <F2> Group Details | <F12> next screen

安裝完成畫面



重新開機畫面



重新開機畫面

```

Loading dm-message.ko module
Loading dm-raid45.ko module
device-mapper: dm-raid45: initialized v0.25941
Waiting for driver initialization.
Scanning and configuring dmraid supported devices
Trying to resume from LABEL=SWAP-sda2
No suspend signature on swap, not resuming.
Creating root device.
Mounting root filesystem.
kjournald starting. Commit interval 5 seconds
EXT3-fs: mounted filesystem with ordered data mode.
Setting up other filesystems.
Setting up new root fs
no fstab.sys, mounting internal defaults
Switching to new root and running init.
unmounting old /dev
unmounting old /proc
unmounting old /sys
SELinux: Disabled at runtime.
type=1404 audit(1287772204.078:2): selinux=0 auid=4294967295 ses=4294967295
INIT: version 2.86 booting
        Welcome to  CentOS release 5.5 (Final)
        Press 'I' to enter interactive startup.
Setting clock (utc): Fri Oct 22 14:30:08 EDT 2010      [ OK ]
Starting udev:

```

開機完成畫面

```
CentOS release 5.5 (Final)
Kernel 2.6.18-194.3.1.el5.web100 on an i686

localhost login: root
Password:
You are required to change your password immediately (root enforced)
Changing password for root
(current) UNIX password:
New UNIX password:
BAD PASSWORD: it is based on a dictionary word
New UNIX password:
BAD PASSWORD: it is based on a dictionary word
New UNIX password:
Retype new UNIX password:
Welcome to the Internet2 pS-Performance Toolkit v3.2rc2

To start configuration, run:

sudo /opt/perfsonar_ps/toolkit/scripts/nptoolkit-configure.py

Once you set passwords, you can login to the web interface and finish
configuration. The web interface should be available at:
https://[host address]/toolkit
[root@localhost ~]# _
```