LevelOne WAP-0008 --- Storage Throughput Measurement

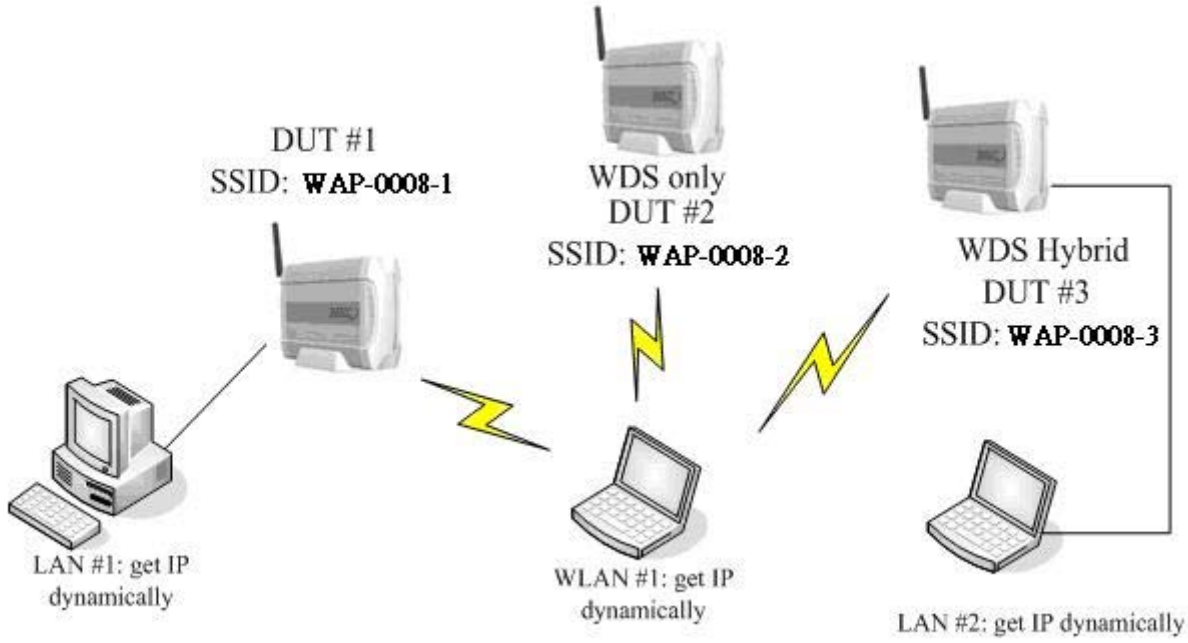
Desktop 802.11g Wireless AP storage

Customer	LevelOne
Product Model	WAP-0008
Product Description	Desktop 802.11g Wireless AP storage
Tester	Wayne
Hardware Version	11340Y20AN000Z2A1
Firmware Version	R4.00a8
Test Date	2007/07/04

Purpose

Measure the DUT's wireless coverage distance and related network transmit throughput by using IxChariot, Samba and DU Meter utilities.

Setup



- **DUT #1(Device Under Test):**
  Model number: **WAP-0008**
  Firmware version: **R4.00a8**
  LAN port IP Address: 192.168.75.2
  WLAN port IP Address: 192.168.75.2
- **DUT #2(Device Under Test):**
  Model number: **WAP-0008**
  Firmware version: **R4.00a8**
  LAN port IP Address: 192.168.75.50
  WLAN port IP Address: 192.168.75.50
- **DUT #3(Device Under Test):**
  Model number: **WAP-0008**
  Firmware version: **R4.00a8**
  LAN port IP Address: 192.168.75.51
  WLAN port IP Address: 192.168.75.51
- **LAN #1**:
  IP Address: 192.168.75.185
  CPU: Pentium M 1.5 GHz(Centrino)
  RAM: 768 MB
  OS: Windows XP Pro
  Wireless: Intel Pro Wireless 2200BG
- **LAN #2**:
  IP Address: 192.168.75.180
  Type: Notebook
  CPU: Pentium M 1.5 GHz Centrino
  RAM: 512MB
  OS: Windows XP SP2
  Wireless NIC: WNC-0301USB
- **WLAN #1**:
  IP Address: 192.168.75.100
  Type: Notebook
  CPU: Pentium M 1.73(Centrino)
  RAM: 768 MB
  OS: Windows XP SP2
  FTP Client: Windows FTP client
  Wireless NIC: WNC-0301USB
- **USB Mass Storage Device**
  Model Name: DATAST0R Technology Corp USB4500 FW1.03
- **Target File:**
  File: test.zip(Samba)
  Size: 800MB
- **Test Tools:**
  Ixia Endpoint program, Ver.5.1.0.2407
  Ixia IxChariot Console, Ver.5.40
  DU meter: v3.05 Build 148

Performance Measurement Procedure

- Test environment: Shielding Box.

  a. Thermometer: 32℃
  b. Humidity: 40~43%

- LAN-to-DUT Write/Read Throughput Test

  1. Connect LAN #1 to the LAN port of DUT #1.
  2. Execute PING command at LAN #1 to monitor whether the connection with DUT #1 is still alive.
  3. Change DUT #1 Nmae:WAP-0008-1.Open the “File manager” and click “search”, type “WAP-0008-1”, check if you can find WAP-0008-1 in LAN.
  4. At LAN #1, via Network Neighborhood put/get the target file to the DUT #1.

     a. Time is set 1 minute.

     b. File size is set to 800MBytes.
  5. Connect USB mass storage device to the USB2.0 port of DUT #1.
  6. Repeat Step 2 to 3.
  7. At LAN #1, via Network Neighborhood put/get the target file to the DUT #1 USB2.0 Storage.

     a. Time is set 1 minute.

     b. File size is set to 800MBytes.
  8. At LAN #1, executes FTP client to connect to the FTP server for file transfer.
  9. At LAN #1, get/put the target file from/to the FTP Server for five times by using FTP client utility.
  10. Calculate the average transmission speed.

- WLAN-to-DUT Write/Read Throughput Test

  1. Locate DUT #1 on a higher place.
  2. Use Wireless interface of WLAN #1 to associate to DUT #1.
  3. Execute PING command at WLAN #1 to monitor whether the connection with DUT #1 is still alive.
  4. Change DUT #1 Nmae:WAP-0008-1.Open the “File manager” and click “search”, type “WAP-0008-1”, check if you can find WAP-0008-1 in WLAN.
  5. At WLAN #1, via Network Neighborhood put/get the target file to the DUT #1.

     a. Time is set 1 minute.

     b. File size is set to 800MBytes.
  6. Connect USB mass storage device to the USB2.0 port of DUT #1.
  7. Repeat Step 4 to 5.
  8. At WLAN #1, via Network Neighborhood put/get the target file to the DUT #1 USB2.0

Storage.

a. Time is set 1 minute.

b. File size is set to 800MBytes.

9. At WLAN #1, executes FTP client to connect to the FTP server for file transfer.
10. At WLAN #1, get/put the target file from/to the FTP Server for five times by using FTP client utility.
11. Calculate the average transmission speed.
12. Wireless client, WLAN #1, is setup with the WNIC WNC-0301USB (LEVELONE).

- Wireless Download and Upload Throughput Test

1. Locate DUT #1 on a higher place.
2. Connect LAN #1 to the LAN port of DUT #1. Enable the IxChariot service of LAN #1.
3. Execute PING command at WLAN #1 to monitor whether the connection with DUT #1 is still alive.
4. Use the wireless interface of WLAN #1 to associate to DUT #1. At WLAN #1, executes IxChariot to measure the throughput between WLAN #1 and LAN #1.

   a. Script is “High_Performance_Throughput.scr”,
   b. Time is set 30 seconds, and
   c. File size is set to 10Mbytes.
5. Wireless client, WLAN #1, is setup with the WNIC WNC-0301USB (LEVELONE).

- Wireless Client mode Download and Upload Throughput Test

1. Locate DUT #1 and DUT #3 on a higher place.
2. Connect LAN #1 to the LAN port of DUT #1.
3. Connect LAN #2 to the LAN port of DUT #3, enable DUT #3 Wireless Client mode to associate to DUT #1 Wireless AP mode.
4. Execute PING command at LAN #1 to monitor whether the connection with DUT #1 and DUT #3 is still alive.
5. At LAN #1, executes IxChariot to measure the throughput between LAN #1 and DUT #3_LAN #2.

   a. Script is “High_Performance_Throughput.scr”,
   b. Time is set 30 seconds, and
   c. File size is set to 10Mbytes.
6. The distance between DUT #1 and DUT #3 is 2 meters.

- Wireless WDS Hybrid mode Download and Upload Throughput Test

1. Locate DUT #1 and DUT #3 on a higher place.
2. Connect LAN #1 to the LAN port of DUT #1, enable DUT #1 WDS Hybrid mode.
3. Connect LAN #2 to the LAN port of DUT #3, enable DUT #3 WDS Hybrid mode to associate to DUT #1 WDS Hybrid mode.
4. Execute PING command at LAN #1 to monitor whether the connection with DUT #1 and

DUT #3 is still alive.

5. At LAN #1, executes IxChariot to measure the throughput between LAN #1 and DUT #3_LAN #2.

   a. Script is “High_Performance_Throughput.scr”,
   b. Time is set 30 seconds, and
   c. File size is set to 10Mbytes..

6. The distance between DUT #1 and DUT #3 is 2 meters.

- Wireless WDS Only mode Download and Upload Throughput Test

1. Locate DUT #1, DUT #2 and DUT #3 on a higher place.
2. Connect LAN #1 to the LAN port of DUT #1, enable DUT #1 WDS Hybrid mode to associate to DUT #2 Wireless AP mode.
3. Connect LAN #2 to the LAN port of DUT #3, enable DUT #3 WDS Hybrid mode to associate to DUT #2 Wireless AP mode.
4. Change LAN #2 to the LAN port of DUT #2,enable DUT #2 WDS Only mode to associate to DUT #1 and DUT #3 WDS Hybrid mode.
5. Change LAN #2 to the LAN port of DUT #3.
6. Execute PING command at LAN #1 to monitor whether the connection with DUT #1, DUT #2 and DUT #3 is still alive.
7. At LAN #1, executes IxChariot to measure the throughput between LAN #1 and DUT #3_LAN #2.

   a. Script is “High_Performance_Throughput.scr”,
   b. Time is set 30 seconds, and
   c. File size is set to 10Mbytes.

8. The distance DUT #1, DUT #2 and DUT #3 is 3 meters.

- Wireless Coverage Distance Measurement

1. Locate DUT on shielding box #1 with Attenuator Throughput Test.
2. Let WLAN #1 associate to DUT for creating a wireless connection.
3. Locate WLAN #1 on shielding box #2.
4. Use IxChariot to measure the throughput between WLAN #1 and LAN #1.

   a. Script is “High_Performance_Throughput.scr”,
   b. Time is set 30 seconds, and
   c. File size is set to 10.0Mbytes.

5. Channel: 3, WEP: Disabled.
6. Wireless client, WLAN #1, is setup with the WNIC WNC-0301USB (LEVELONE).

Performance Target Values

■ SMB / FTP for Wired

Mode			Target Performance Value	
			Write Average (Mbps)	Read Average (Mbps)
SMB	Internal	SATA	38	40
		ATA	37	39
	External	USB2.0	21	26
FTP	Internal	SATA	41	45
		ATA	41	45
	External	USB2.0	22	27

■ SMB / FTP for Wireless

Mode			Target Performance Value	
			Write Average (Mbps)	Read Average (Mbps)
SMB	Internal	SATA	23	22
		ATA	22	21
	External	USB2.0	16	17
FTP	Internal	SATA	27	26
		ATA	25	24
	External	USB2.0	17	18

■ Wireless mode (WAP-0008)

Grade / Mode	Target Performance Value											
	(1:LAN，2：WLAN) Average (Mbps)						(Redirection) Average (Mbps)					
	Normal	128bit	WEP (128bit)	WPA (TKIP)	WPA-PSK (AES)	WPA2	Normal	128bit	802.1x (128bit)	WPA (TKIP)	WPA-PSK (AES)	WPA2
AP (1->2)	33	33	32	32	33	33	34	34	33	33	33	33
AP (2->2)	16.5	16.5	16	16	16.5	16.5	17	17	16.5	16.5	16.5	16.5
Client (1->1)	33	33	N/A	N/A	33	N/A	34	34	N/A	N/A	34	N/A
WDS Hybrid (1->1)	22	22	N/A	N/A	22	22	23	23	N/A	N/A	23	23
WDS Hybrid (1->2)	12	12	N/A	N/A	12	12	13	13	N/A	N/A	13	13
WDS Only (1->1)	10	10	N/A	N/A	10	10	10	10	N/A	N/A	10	10
WDS Only (1->2)	7	7	N/A	N/A	7	7	7	7	N/A	N/A	7	7

Wireless Coverage Distance and Throughput

Grade / Attenuator Value(dB)	Target Performance Value											
	AP-TX						AP-RX					
	0	**25**	**30**	**35**	**40**	**45**	**0**	**25**	**30**	**35**	**40**	**45**
Value (Mbps)	**34**	**27**	**17**	**11**	**4**	**N/A**	**34**	**27**	**17**	**11**	**4**	**N/A**

Performance Measurement Results

SMB / FTP for Wired

Mode			Write Average (Mbps)	Read Average (Mbps)
SMB	Internal	SATA	40.36	39.55
		ATA	38.06	39.12
	External	USB2.0	20.65	23.23
FTP	Internal	SATA	42.15	50.05
		ATA	42.49	46.45
	External	USB2.0	22.51	25.77

SMB / FTP for Wireless

Mode			Write Average (Mbps)	Read Average (Mbps)
SMB	Internal	SATA	26.10	21.59
		ATA	25.85	21.81
	External	USB2.0	18.29	17.57
FTP	Internal	SATA	32.96	27.45
		ATA	32.56	26.87
	External	USB2.0	19.57	19.49

Access Point (AP)

Wireless Routing Throughput (WLAN to LAN)

Security	Channel 3	
	LAN->WLAN Average (Mbps)	WLAN->LAN Average (Mbps)
no	33.854	33.643
128-bit	33.032	33.609
802.1x(128bit)	32.171	33.590
WPA(TKIP)	31.840	33.258
WPA-PSK(AES)	33.108	33.609
WPA2-PSK(AES)	33.402	33.592
WPA2(TKIP)	31.747	33.159

Wireless to Wireless Throughput (WLAN to WLAN)

Security	Channel 3	
	WLAN->WLAN Average (Mbps)	WLAN->WLAN Average (Mbps)
no	17.602	15.455
128-bit	17.388	15.253
802.1x(128bit)	17.393	15.154
WPA(TKIP)	16.124	17.210
WPA-PSK(AES)	17.352	15.243
WPA2-PSK(AES)	16.849	15.229
WPA2(TKIP)	17.164	14.627

AP (WAP-0008) + Client mode

Security	Channel 3	
	DUT #1 LAN->DUT #2 LAN Average (Mbps)	DUT #2 LAN->DUT #1 LAN Average (Mbps)
no	34.927	35.199
128bit	34.501	34.454
WPA-PSK(AES)	34.878	32.855

WDS Hybrid mode

Security	Channel 3	
	DUT #1 LAN->DUT #2 LAN Average (Mbps)	DUT #2 LAN->DUT #1 LAN Average (Mbps)
no	22.361	22.891
128bit	22.965	22.400
WPA-PSK(AES)	22.211	20.232
WPA2-PSK(AES)	21.596	20.690

Security	Channel 3	
	DUT #1 LAN->DUT #2 WLAN Average (Mbps)	DUT #2 WLAN->DUT #1 LAN Average (Mbps)
no	12.241	13.623
128bit	12.221	13.523
WPA-PSK(AES)	11.872	13.592
WPA2-PSK(AES)	12.036	13.480

WDS Only mode

Security	Channel 3	
	DUT #1 LAN->DUT #3 LAN Average (Mbps)	DUT #3 LAN->DUT #1 LAN Average (Mbps)
no	10.735	10.867
128 bit	10.706	10.812
WPA-PSK(AES)	10.704	10.575
WPA2-PSK(AES)	10.580	10.737

Security	Channel 3	
	DUT #1 LAN->DUT #3 WLAN Average (Mbps)	DUT #3 WLAN->DUT #1 LAN Average (Mbps)
no	7.457	7.611
128 bit	7.433	7.591
WPA-PSK(AES)	7.490	7.586
WPA2-PSK(AES)	7.400	7.754