

WISENET

NETWORK VIDEO RECORDER

Product Specification Manual

PRN-4011



Network Video Recorder

Product Specification Manual

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- ❖ Design and specifications are subject to change without prior notice.
You can download the latest version from the Hanwha Techwin web site. (www.hanwha-security.com)
- ❖ The initial administrator ID is “admin” and the password should be set when logging in for the first time.
Please change your password every three months to safely protect personal information and to prevent the damage of the information theft.
Please, take note that it's a user's responsibility for the security and any other problems caused by mismanaging a password.

IMPORTANT SAFETY INSTRUCTIONS

Read these operating instructions carefully before using the unit.
Follow all the safety instructions listed below.
Keep these operating instructions handy for future reference.

- 1) Read these instructions.
- 2) Keep these instructions.
- 3) Heed all warnings.
- 4) Follow all instructions.
- 5) Do not use this apparatus near water.
- 6) Clean the contaminated area on the product surface with a soft, dry cloth or a damp cloth. (Do not use a detergent or cosmetic products that contain alcohol, solvents or surfactants or oil constituents as they may deform or cause damage to the product.)
- 7) Do not block any ventilation openings, Install in accordance with the manufacturer's instructions.
- 8) Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- 9) Do not defeat the safety purpose of the polarized or grounding- type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. if the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- 10) Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- 11) Only use attachments/accessories specified by the manufacturer.
- 12) Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/ apparatus combination to avoid injury from tip-over.
- 13) Unplug this apparatus during lightning storms or when unused for long periods of time.
- 14) Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.



Standards Approvals



- ! Any changes or modifications in construction of this device which are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
- ☑ This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
- This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.
This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

BEFORE START

This manual provides operational information necessary for using the product and contains a description about each component part and its function as well as menu or network settings.
You have to keep in mind the following notices :

- Hanwha Techwin retains the copyright on this manual.
- This manual cannot be copied without Hanwha Techwin's prior written approval.
- We are not liable for any or all losses to the product incurred by your use of non-standard product or violation of instructions mentioned in this manual.
- Prior to opening the case, please consult a qualified technician first. Whenever this is needed power must be removed from the unit.
- Before adding a hard disk drive or external storage (USB memory, USB HDD, etc), check if it is compliant with this product. For the compatibility list, contact the retailer.

Warning

Battery

It is essential that when changing the battery in the unit, the replacement battery must be of the same type otherwise there may be a possibility of an explosion.

The following are the specifications of the battery you are using now.

- Normal voltage : 3V
- Normal capacity : 210mAh
- Continuous standard load : 0.4mA
- Operating temperature : -20°C ~ +60°C
(-4°F ~ +140°F)

CALIFORNIA USA ONLY

This Perchlorate warning applies only to primary CR (Manganese Dioxide) Lithium coin cells in the product sold or distributed ONLY in California USA.
"Perchlorate Material - special handling may apply.
See www.dtsc.ca.gov/hazardouswaste/perchlorate."

Caution

- Connect the power cord into a grounded outlet.
- The Mains plug is used as a disconnect device and shall stay readily operable at any time.
- Batteries shall not be exposed to excessive heat such as sunshine, fire or the like.
- RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE. DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS.
- When the HDD reaches its end of life, the stored video data may be damaged, and not be able to be recovered.
- The HDD status LED on the front of the system continuously blinks to indicate that the system's connection to the HDD is normal. Check the HDD status LED regularly to see if it blinks continuously. Recording may not be possible when there is an HDD failure.
Periodically check the recording status and backup important data regularly.

ATTENTION

- IL Y A RISQUE D'EXPLOSION SI LA BATTERIE EST REMPLACÉE PAR UNE BATTERIE DE TYPE INCORRECT.
METTRE AU REBUT LES BATTERIES USAGÉES CONFORMÉMENT AUX INSTRUCTIONS.

System Shutdown

Turning off the power while the product is in operation, or undertaking improper actions may cause damage or malfunction to the hard drive or the product.
Press <OK> on the system shutdown popup window and then remove the power cable to ensure a safe power off.
You may want to install a UPS system for safe operation in order to prevent damage caused by an unexpected power stoppage. (Any questions concerning UPS, consult your UPS retailer.)

 If powered off abnormally, restarting may take more time for restoring data from hard disk drive for proper operation.

Operating Temperature

The guaranteed operating temperature range of this product is 0°C ~ 40°C (32°F ~ 104°F).
This product may not work properly if you run right after a long period of storage at a temperature below the guaranteed one.
Prior to using a device that has been stored for a long period in low temperatures, allow the product to stand at room temperature for a period.
Especially for the built-in HDD in the product, its guaranteed temperature range is 5°C ~ 55°C (41°F ~ 131°F).
Likewise, the hard drive may not work at a temperature below the guaranteed one.

Ethernet Port

This equipment is in door use and all the communication wirings are limited to inside of the building.


Security Precautions

The initial administrator ID is “admin” and the password should be set when logging in for the first time.
Please change your password every three months to safely protect personal information and to prevent the damage of the information theft.
Please, take note that it’s a user’s responsibility for the security and any other problems caused by mismanaging a password.

Use of graphical symbols

Graphical symbols placed on the equipment, whether required by this standard or not, shall be in accordance with IEC 60417 or ISO 3864-2 or ISO 7000, if available. In the absence of suitable symbols, the manufacturer may design specific graphical symbols.

Symbols placed on the equipment shall be explained in the user manual.

Symbol	Publication	Description
	IEC60417, No.5032	Alternating current

NVR products supporting each feature

Function	Products
Fan	PRN-4011
RAID	PRN-4011
iSCSI	PRN-4011
Joystick	PRN-4011
Extended monitor	PRN-4011
Power supply redundancy	PRN-4011
Failover	PRN-4011

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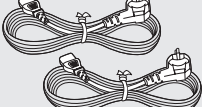
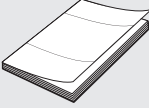
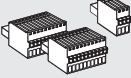
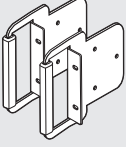



FEATURES

The product records video and audio from network cameras to a hard disk, and enables playback from the hard disk. It also provides remote monitoring environment for video and audio over the network using a remote computer.

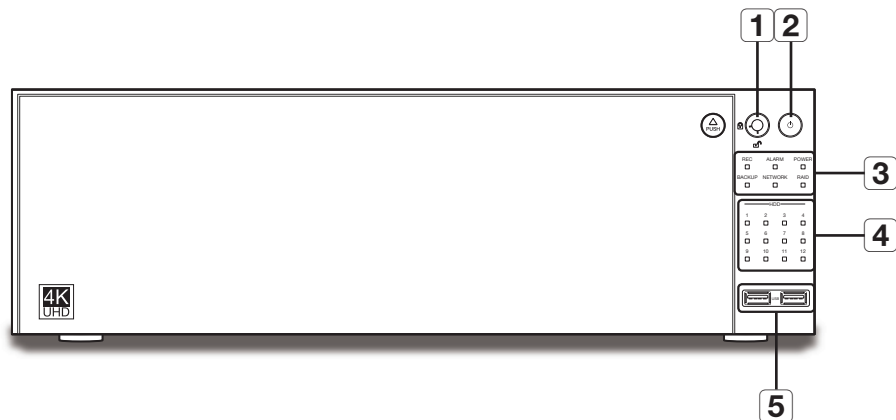
- User-friendly UI
- Supports a range of 4K camera resolutions (3840X2160, 4096X2160, 4000X3000)
- Outputs a 4K high definition image using HDMI
- 64 split screens decoding
- Supports dual monitor output (expand, duplicate)
- Supports multiple passwords
- Record and play video
- Record and play audio
- Supports ONVIF Profile S standard and RTP / RTSP protocols
- Display the HDD operation status by HDD SMART
- HDD overwrite enabled
- Backup using USB 2.0 protocols and external HDD
- Simultaneous play of 16 channels
- Various Search Modes (Time, Event, Smart, Text, Backup, ARB)
- Various Recording Modes (Normal, Event, Scheduled Recording)
- Alarm Input / Output
- Remote Monitoring function by Windows Network Viewer
- Live monitoring of the network camera
- Installation Wizard Function (Easy Setup)
- Supports remote viewer multi profiles
- Supports ARB
- Supports Failover
- Function used to set the storage period for each channel

Package Contents

Please unwrap the product, and place the product on a flat place or in the place to be installed. Please check the following contents are included in addition to the main unit.

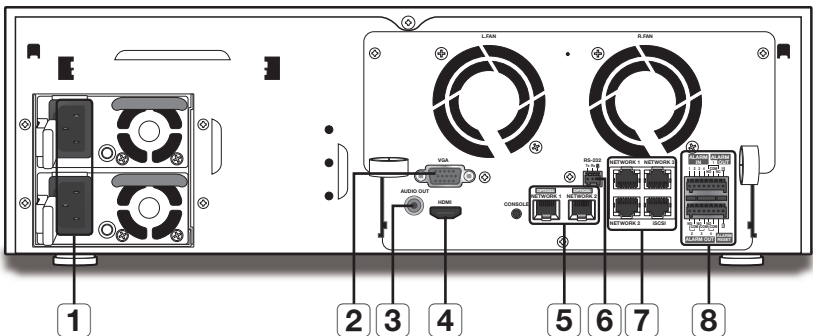
		
NVR	Mouse	Power Cable
		
Quick Manual	Terminal block	Rack mount
		
Rack mounting screw	HDD Fixing Screw	HDD door lock key

PART NAMES AND FUNCTIONS (FRONT)



Part Names		Functions
1	HDD door lock key	This is a locking device used to restrict access to the HDD. Use the product key provided when you purchased the product.
2	Power	Used to turn the ON/OFF.
3	LED Indicator	REC : Lights on when recording is in progress.
		ALARM : Lights on when an event occurs.
		POWER : Shows the power ON/OFF status.
		BACKUP : Displays when Backup is in progress.
		NETWORK : Displays both network connection and data transfer status.
		RAID : Displays ongoing RAID operation.
4	HDD	Displays the normal access to HDD. LED turns on when accessing the hard disk.
5	USB	Connects the USB devices.

PART NAMES AND FUNCTIONS (REAR)



Part Names		Functions
1	Power	Terminal to connect power to. <ul style="list-style-type: none">With duplex power supply, even if you connect only one power supply, it can operate properly. However, for reliability, it is recommended you use separate power supplies.If a problem occurs during motion, SMPS buzzer will sound. (you can turn off the buzzer by pressing the round green button)Even if the power supply is not connected, the applicable green SMPS button LED and SMPS fan can be operated.
2	VGA	VGA Video Signal Output Port.
3	AUDIO OUT	Audio Signal Output Port (RCA jack).
4	HDMI	HDMI connector port.
5	OPTICAL NETWORK 1/2	Optical communications I/F port.
6	RS-232C	Cable terminal for serial communication.
7	NETWORK 1	Port for camera connections; it receives video from a camera.
	NETWORK 2	Port for camera connections; it receives video from a camera.
	NETWORK 3	Port used to send video to the web viewer.
	iSCSI	Port to make a connection to the external iSCSI.
8	ALARM	- ALARM IN : Alarm input ports. (1~4 CH) - ALARM RESET : Alarm Reset port - ALARM OUT : Alarm output ports. (1~4 CH)

 [CONSOLE] is designed for the service repair purpose only.

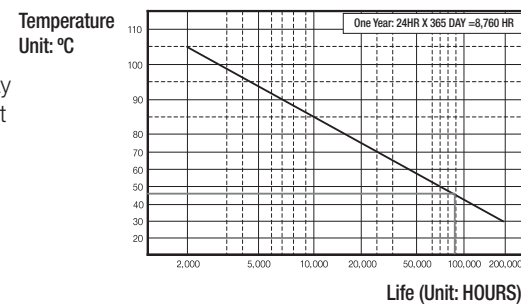
Please take note of the followings before using this product.

- Do not use the product outdoor.
- Do not spill water or liquid in the connection part of the product.
- Do not impose the system to excessive shock or force.
- Do not pull out the power plug forcefully.
- Do not disassemble the product on your own.
- Do not exceed the rated input/output range.
- Use a certified power cord only.
- For the product with an input ground, use a grounded power plug.

CHECKING THE INSTALLATION ENVIRONMENT

This product is a top-notch security device that is equipped with a high-capacity HDD and other key circuit boards.

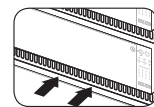
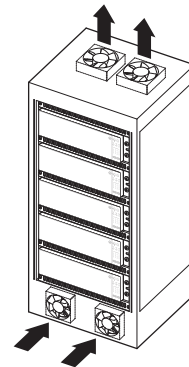
Note that an excessive internal temperature of the product may cause a system failure or a shortened product life (see the right figure). Keep in mind the following instructions before installing the product.



[Figure 1]

When mounting the product on a rack, comply with the following instructions.

1. Please ensure that the rack inside is not sealed.
2. Please ensure the air is circulated through the inlet/outlet as shown in the picture.
3. If you pile up the products or other rack-mount devices as shown in figure 2, secure room for ventilation or install a vent.
4. For natural air convection, place the inlet at the bottom of the rack and the outlet on top.
5. It is strongly recommended that a fan motor is installed at the inlet and the outlet for air circulation. (Please fit a filter at the inlet to screen dust or foreign substances.)
6. Please maintain the temperature inside the rack or surrounding areas between 0°C ~ 40°C (32°F ~ 104°F) as shown in the figure 1.



[Figure 2]

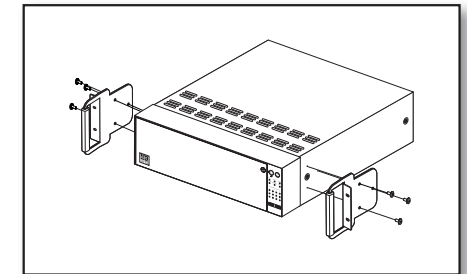
Rack Mount Instructions - The following or similar rack-mount instructions are included with the installation instructions :

- A) Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (T_{ma}) specified by the manufacturer.
- B) Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
- C) Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
- D) Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- E) Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

RACK INSTALLATION

Install the Bracket-Rack as shown in the figure, and then fasten the screws on both sides.

- Fix the screws not to be loosened by vibrations.



HDD ADDITION

Make sure to unplug the power cord from the wall outlet to prevent possible electric shock, injury or product damage. Please consult your provider for further information on HDD installation since improper installation or settings may damage the product.

- Number of HDDs supported : Up to 12 HDDs supported
- Make sure to unplug the power cord from the wall outlet before proceeding with the installation.



■ Cautions for data loss (HDD care)

Please pay attention so that the data inside the HDD is not damaged. Before adding a HDD, please check the compatibility with this product. HDD is vulnerable to malfunction due to its sensitive nature especially against shock when operating. Please ensure that the HDD is free from such shock. We are not liable for any damage to the HDD incurred by user's carelessness or miss use.

■ Cases might cause damage to HDD or recorded data

To minimize the risk of data loss from a damaged HDD, please backup data as often as possible. If exposed to shock when disassembling or installing, data stored in the hard disk may be damaged. A sudden power failure or turning off the product while in HDD operation may damage the hard disk drive. HDD or files stored inside may be damaged if the main body is moved or impacted during the HDD operation.

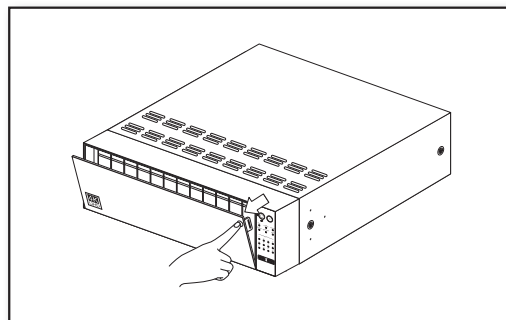
Cautions when installing a HDD

1. Do not apply excessive force to the HDD.
2. Pay attention so as not to lose the disassembly screws or accessories.
 - If the screws or accessories are not put together correctly, the product may breakdown or not operate properly.
3. Please check the HDD compatibility before adding a HDD.
 - Please contact your nearest dealer to obtain the list of compatible devices.
4. If you wish to replace or add an HDD, contact your dealer or our customer service first.
 - Only the product administrator can open the HDD door on the front side.

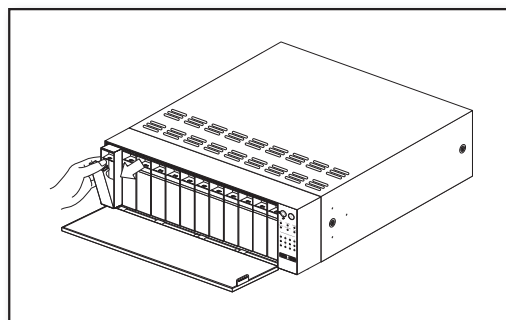
Installing the HDD

- ! ■ If you are adding a new or previously used HDD to this product in addition to the HDD(s) originally installed, format the new HDD manually in the set before use.
To learn how to format, see "Device/Format" in the Wisenet NVR User Manual.
- For replacement or installation of an additional HDD you must contact your dealer or our customer center.

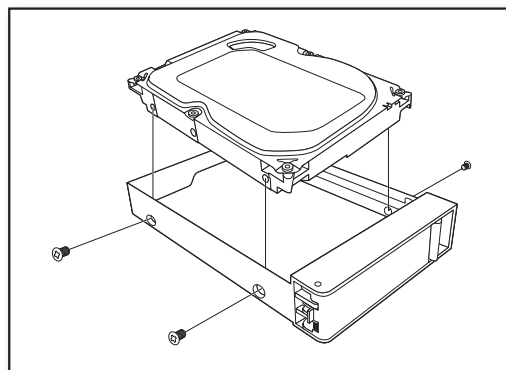
1. Press the <PUSH> button on the front to open the front cover.



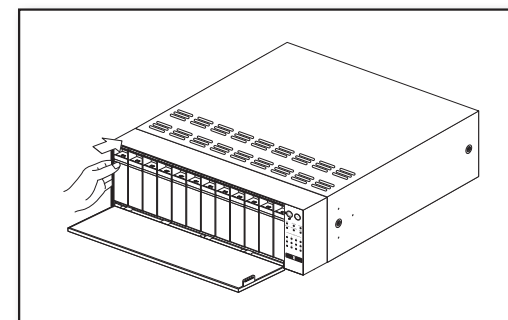
2. After pressing the blue button in the HDD bracket, pull it manually to separate the HDD bracket from the main body.



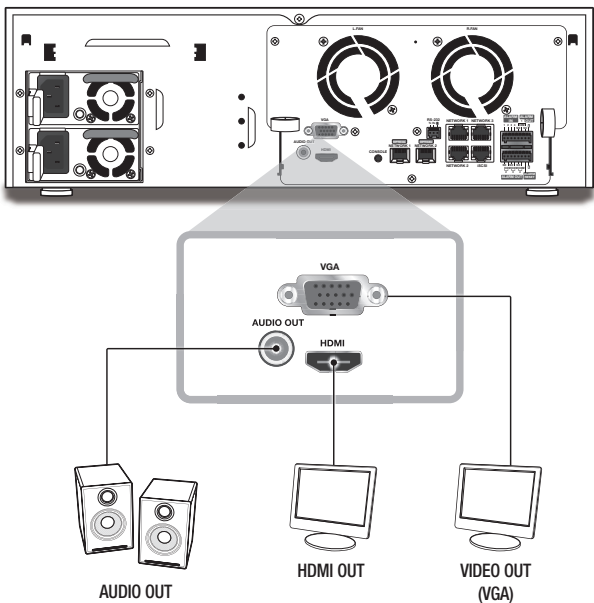
3. Mount a HDD in the HDD bracket and screw it in using the screws provided.



4. Once the HDD is mounted in the bracket, push the bracket into the main body and close the front cover.



CONNECTING TO AN EXTERNAL DEVICE

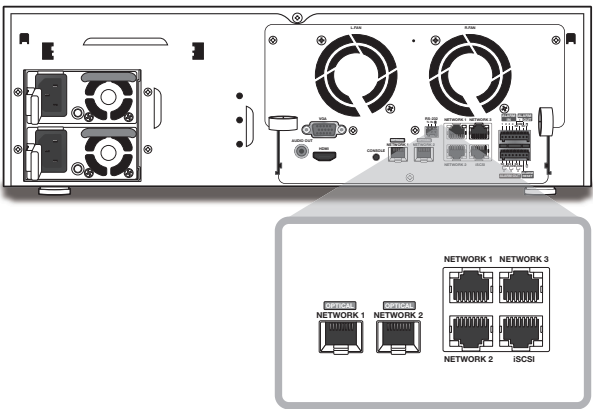


! Unrated or improper power source may cause damage to the system. Ensure that you use only the rated power source before pressing the POWER button.

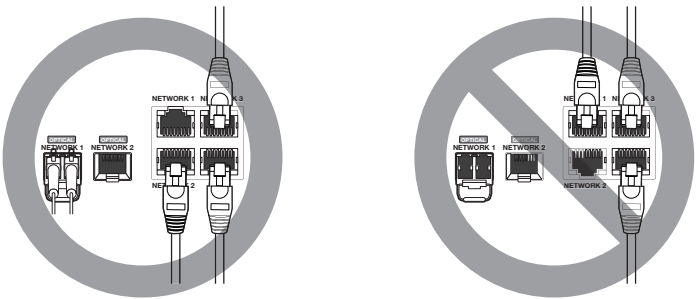
CONNECTING AN OPTICAL MODULE

The rated power for an optical module is DC 3.3V 0.25A.

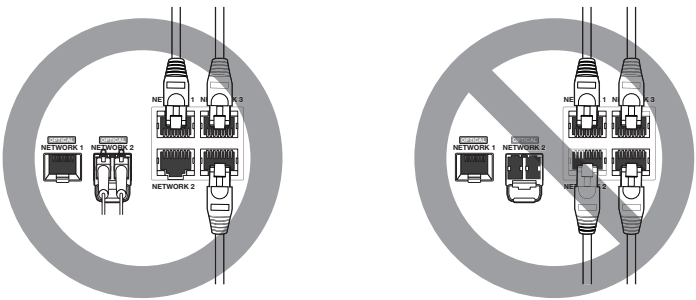
- When an optical module is installed, the use of the UTP port is limited.
- Install an optical module only when one is needed.



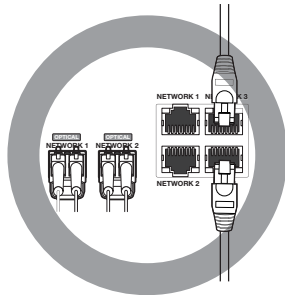
1. [OPTICAL NETWORK1] is a port that is shared with [NETWORK1].



2. [OPTICAL NETWORK2] is a port that is shared with [NETWORK2].



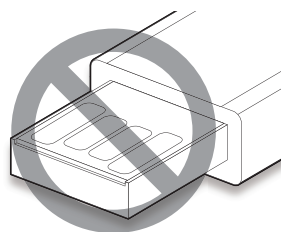
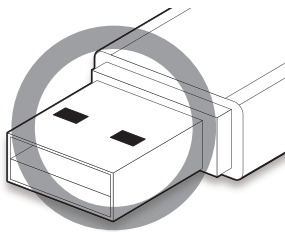
3. [OPTICAL NETWORK1/2] is a port that is shared with [NETWORK1/2].



CONNECTING THE USB

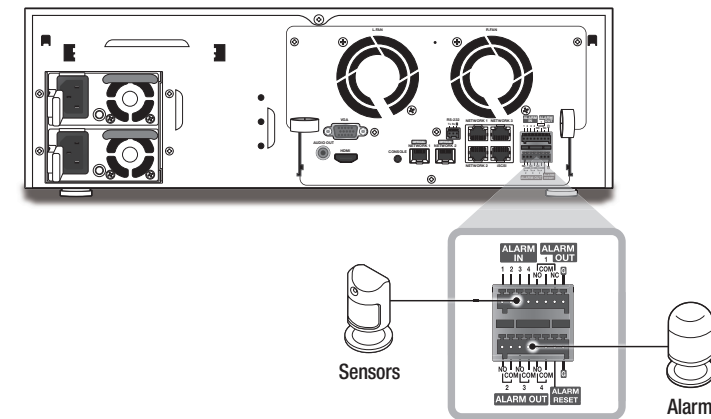
1. On the front of the product, there is a USB port.
2. You can connect a USB HDD, USB memory or mouse to the USB port.
3. If your USB HDD is connected to the system, it can be detected and set up by following the steps in "Menu > Device > Storage Device" of the Wisenet NVR User Manual.
4. The product supports hot plugging function that enables connecting/disconnecting USB devices while in operating the system.

- ! If you use the USB device for Backup purposes, format it with FAT32 on PC if it is not formatted on the NVR.
- Some USB devices may fail to function properly due to compatibility issue, please check the device before using.
- Only USB storage devices that comply with the standards (having a metal cover) are guaranteed for data transfer.
- In case if the USB device's electric contacts have been worn out, data transfer between the devices may not properly function.

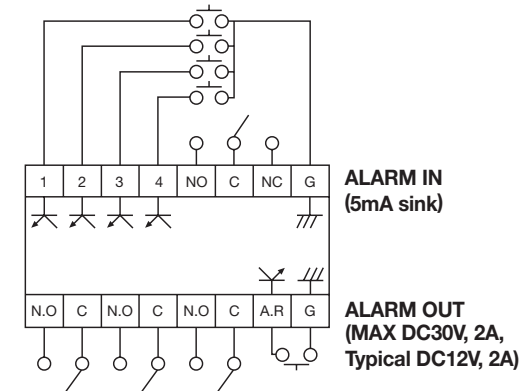


CONNECTING THE ALARM INPUT/OUTPUT

The Alarm In/Out port at the back is composed of the following.



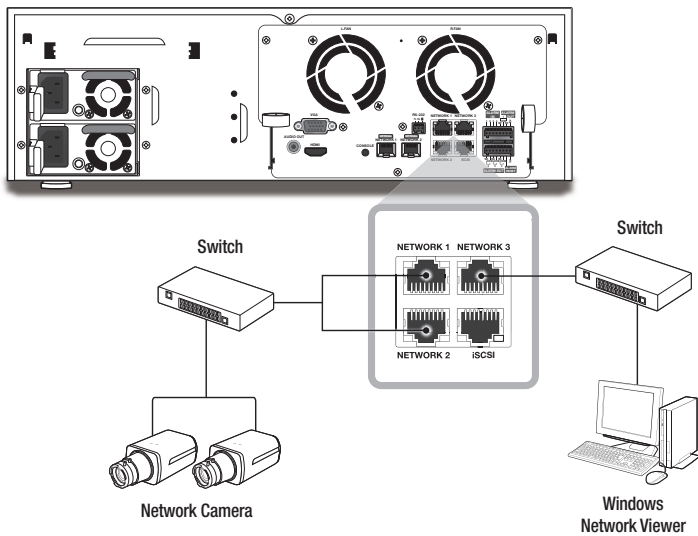
- ALARM IN 1 ~ 4 : Alarm Input Port
- ALARM RESET : On receiving an Alarm Reset signal, the system cancels the current Alarm Input and resumes sensing.
- ALARM OUT 1 ~ 4 : Alarm Output Port



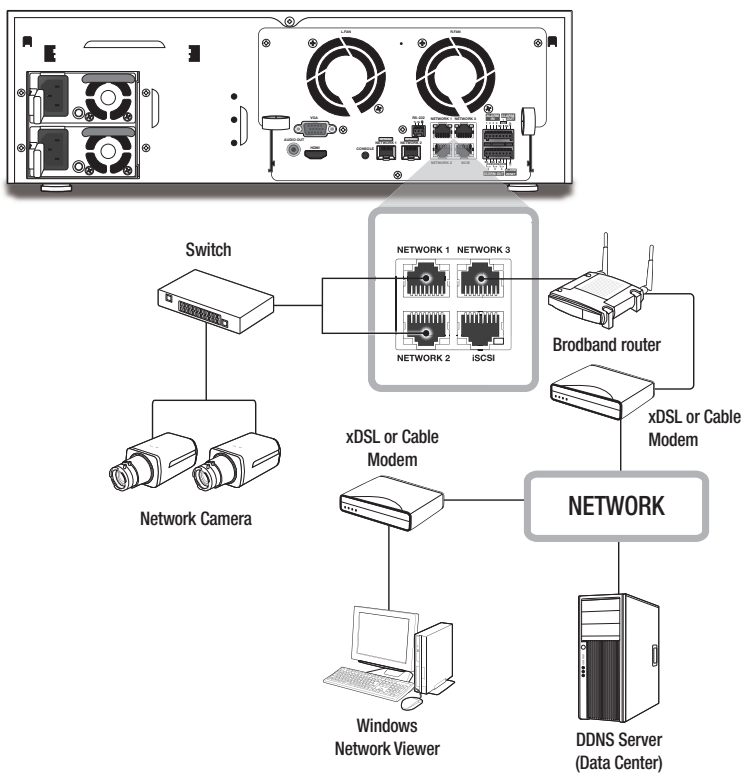
CONNECTING THE NETWORK

For more information about network connection, see "Network Configuration" in the Wisenet NVR User Manual.

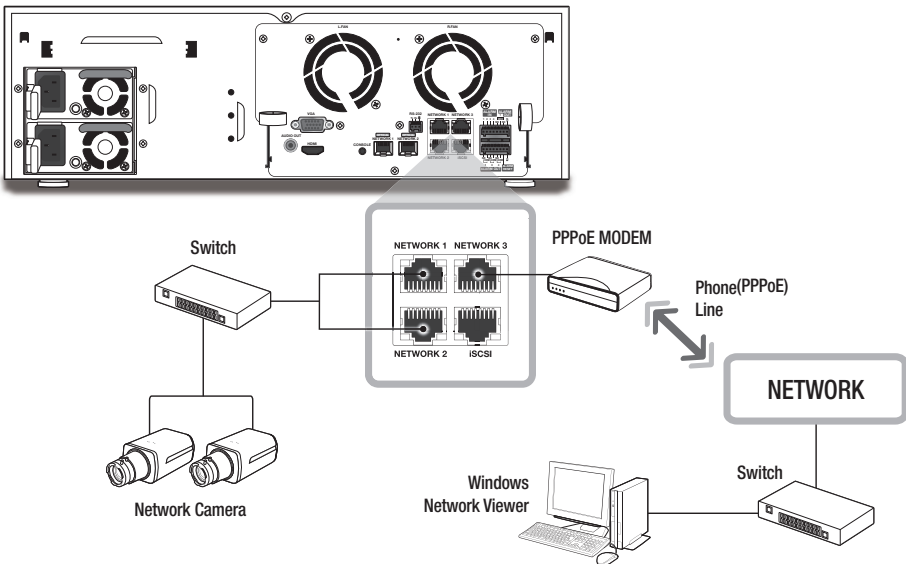
Network connection via Ethernet (10/100/1000BaseT)



Network connection via router

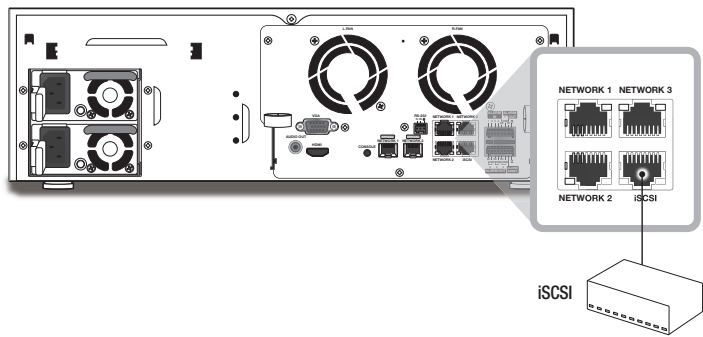


Connecting to Internet through PPPoE

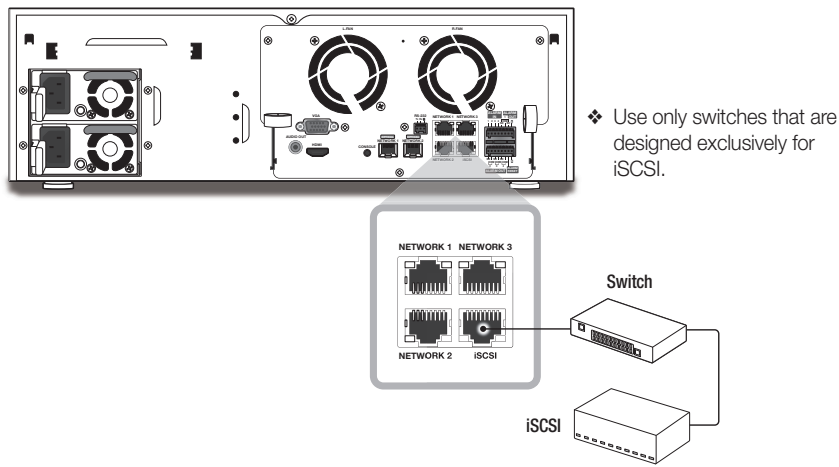


Connecting the iSCSI

Directly connecting to the NVR



A switch can be used for connection



Item		Details	
Display			
Network Camera	Inputs	Max. 64CH	
	Resolution	CIF ~ 12MP	
	Protocols	Wisenet, ONVIF	
Live	Local Display	1x HDMI / 1x VGA Dual Monitor	
	Performance	[Local Monitor] - 12M (30fps) - 8.3M(120fps) - 1080p(480fps) - 720P(960fps) - D1(1920fps)	
Performance			
Operating System	Embedded	Linux	
Record	Compression	H.265, H.264, MJPEG, WiseStream(H.265, H.264)	
	Recording Bandwidth	Max. 250Mbps (Non RAID)	Max. 400Mbps (RAID-5/6)
	Resolution	CIF ~ 12MP	
Search & Play	Playback Bandwidth	Max. 32Mbps(16ch simultaneously)	
	User	Max. 4 Users (Local 1, Remote 3)	
	Simultaneous playback	Max. 16 channels(Local Monitor, CMS)	
	Resolution	CIF ~ 12MP	
	Fisheye Dewarping	WEB / CMS	
	Playback Control	Fast/Slow Forward/Backward, Move one step up/down	
Storage	Built-In	0TB ~ 8TB	
	Internal HDD	12 (Max 96TB, Non-RAID Mode)	
	External	iSCSI storage(Max. 192TB)	
	RAID	RAID-5/6(Array Size : 6-HDD x 2 Array)	
Backup	File backup	BU/Exe(GUI), JPG/AVI(Network)	
	Function	Multi channel(Upto 16CH) Play, Date-Time/Title display	

Item		Details
Sensor	I/O	4/4 (NO/NC Selectable)
Audio	Input	64 channels (network)
	Compression	G.711, G.726, AAC(16/48KHz)
	Audio Communication	2-Way
Network		
Interface		RJ-45(Gigabit Ethernet) x4, SFP x2
Protocol		TCP/IP, UDP/IP, RTP (UDP), RTP (TCP), RTSP, NTP, HTTP, DHCP (Server, Client), PPPoE, SMTP, ICMP, IGMP, ARP, DNS, DDNS, uPnP, HTTPS, SNMP, ONVIF (Profile-S), SUNAPI(Server, Client)
DDNS		Hanwha DDNS
Transmission Bandwidth		Max. 400Mbps
Max Remote Users		Search(3) / Live unicast(10) / Multicast(20)
IP Version		IPv4/v6
Security		IP address filtering, User access Log, 802.1x, Encryption, 2Men-Rule
Language		English, French, German, Italian, Spanish, Russian, Turkish, Polish, Dutch, Swedish, Czech, Portuguese, Danish, Rumanian, Serbian, Croatian, Hungarian, Greek, Norwegian, Finnish, Korean, Chinese, Japanese, Thai
OS		Window 7, 8, 10, Mac OS X(10.8 or above)
Web Browser		MS IE, Google Chrome, Mac Safari
Viewer Software	Type	SSM, Webviewer, SmartViewer, Wisenet Mobile Viewer
	CMS Support	Support SDK/CGI(SUNAPI) for integration to 3'rd party VMS
Functions		
PTZ	Control	Via GUI, Webviewer, SPC-2000
	Preset	300 Presets
Smart phone	Support Model	Android, iOS
	Protocol Support	RTP, RTSP, HTTP, CGI (SUNAPI)
	Control	Live(16ch) : Multi-Profile Support Playback(1ch)
	Max. Remote Users	Search(3) / Live unicast(10)

Item		Details
Redundancy	Failover	N+1
	ARB	Yes
System Control		Mouse, Web, SPC-2000(Controller)
Indicator/Interface		
Front	Indicator	LED(Status indicator) - HDD Action(12), RAID Status(1), Alarm(1), Power(1), Record(1), Backup(1), Network(1)
Connectors	VGA	Sub : 1 EA (Support Live screen upto 32 div. mode)
	HDMI	Main : 1 EA (Both Support Live / PB / Setup) - Support upto 4K (3840 x 2160, Single Monitor Mode 64 div)
	Audio	Out(1EA, RCA, Line)
	Ethernet	RJ-45 4EA (LAN/WAN, 1Gbps), 1000M SFP 2ea
	Alarm	1) In(4EA, Terminal Block) 2) Alarm Reset(1EA) 3) Out (4EA, Terminal Block) - Relay Out1(NO/NC/COM) - Relay Out2~4(NO/COM)
	USB	2EA(Front 2)
	Storage	iSCSI
	Serial	RS-232C
	Reset	Switch(1EA)
	Power Cord	2EA AC Inlet

Item		Details
System		
Log	Log List	Max. 20,000 (System Log, Event Log each)
Environmental		
Operating Temperature / Humidity		+0°C to +40°C (+32°F to +104°F)
Humidity		20% ~ 85% RH
Electrical		
Power		100 ~ 240 VAC ±10%; 50/60 Hz, 3~1.5A (Dual SMPS)
Power Consumption		Max. 250W (853 BTU with HDD 12ea)
Mechanical		
Color / Material		Black / Metal
Dimension (WxHxD)		W436.0 x H132.0 x D450.0mm (17.17" x 5.2" x 17.72") (3U)
Weight		Approx. 11Kg (24.3 lb, HDD not included)

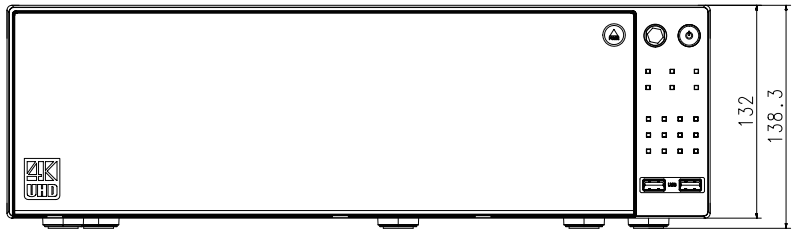
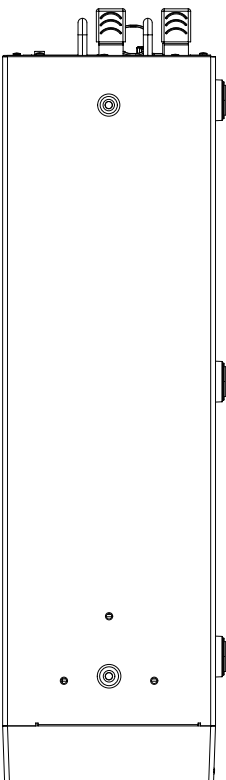
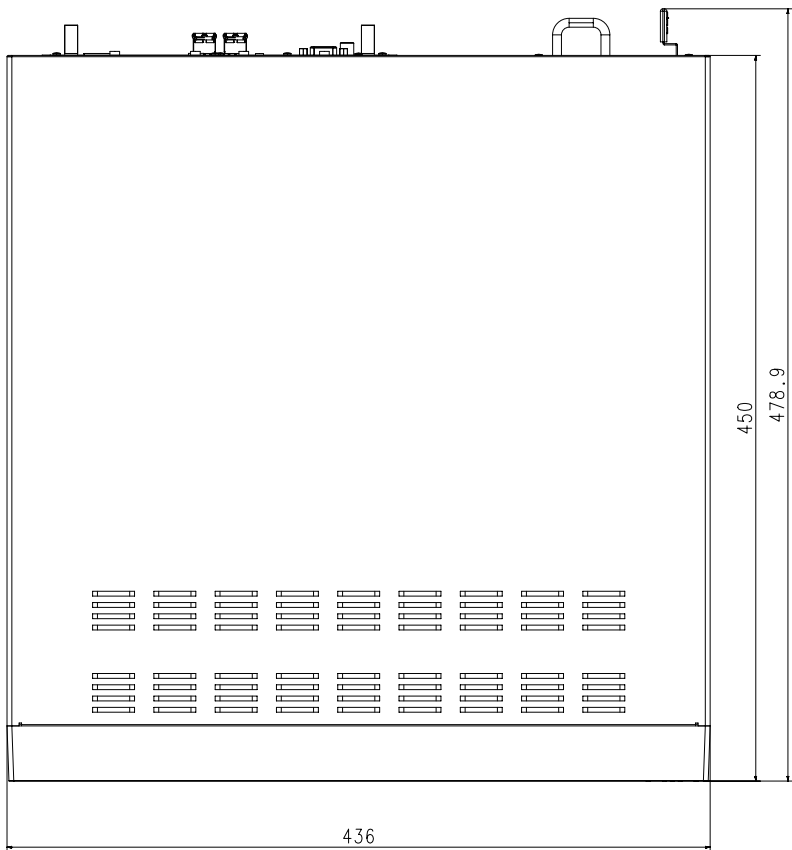
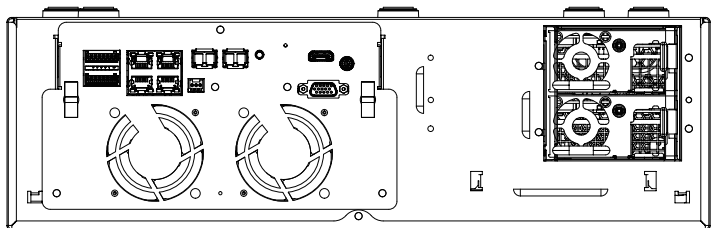
Recording performance spec for the HDD condition

Unit : (Mbps)

Storage method	Rcv	Save			Remote transmission	Playback
		Internal		iSCSI		
		Normal	Rebuilding			
Internal (RAID5)	400	400	320	300	300	32
Internal (RAID6)	400	400	320	300	300	32
Single HDD	400	250	-	250	300	32
iSCSI	300	-	-	300	300	32

※ Internet/iSCSI storage performance is based on an individual use scenario

unit : mm (inches)



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```

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3. [3]Viraj Bais <vbais@mailman1.intel.com> and [4]Clayton Kirkwood <kirkwood@striderfm.intel.com> port to WindowsNT 3.5

4. [5]Michael Barone <michael,barone@lmco.com> GPSVME fixes

5. [6]Karl Berry <karl@owl.HQ.ileaf.com> syslog to file option

6. [7]Greg Brackley <greg.brackley@bigfoot.com> Major rework of WINNT port. Clean up rcvbuf and iosignal code into separate modules.

7. [8]Marc Brett <Marc.Brett@westgeo.com> Magnavox GPS clock driver

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12. [13]Sven Dietrich <sven_dietrich@trimble.com> Palisade reference clock driver, NT adj. residuals, integrated Greg's Winnt port.

13. [14]John A. Dundas III <dundas@salt.jpl.nasa.gov> Apple A/UX port

14. [15]Torsten Duwe <duwe@immd4.informatik.uni-erlangen.de> Linux port

15. [16]Dennis Ferguson <dennis@mrbill.canet.ca> foundation code for NTP Version 2 as specified in RFC-1119

16. [17]Glenn Hollinger <glenn@herald.usask.ca> GOES clock driver

17. [18]Mike Iglesias <iglesias@uci.edu> DEC Alpha port

18. [19]Jim Jagielski <jim@jagubox.gsfc.nasa.gov> A/UX port

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22. [24]Frank Kardel [25]<Frank.Kardel@informatik.uni-erlangen.de> PARSE <GENERIC> driver (14 reference clocks), STREAMS modules for PARSE, support scripts, syslog cleanup

23. [26]William L. Jones <jones@hermes.chpc.utexas.edu> RS/6000 AIX modifications, HP/UX modifications

24. [27]Dave Katz <dkatz@cisco.com> RS/6000 AIX port

25. [28]Craig Leres <leres@ee.lbl.gov> 4.4BSD port, ppsclock, Magnavox GPS clock driver

26. [29]George Lindholm <lindholm@ucs.ubc.ca> SunOS 5.1 port

27. [30]Louis A. Mamakos <louie@ni.umd.edu> MD5-based authentication

28. [31]Lars H. Mathiesen <thorinn@diku.dk> adaptation of foundation code for Version 3 as specified in RFC-1305

29. [32]David L. Mills <mills@udel.edu> Version 4 foundation: clock discipline, authentication, precision kernel; clock drivers: Spectracom, Austron, Arbiter, Heath, ATOM, ACTS, KSI/Odetics; audio clock drivers: CHU, WWW/H, IRIG

30. [33]Wolfgang Moeller <moeller@gwdgv1.dnet.gwdg.de> VMS port

31. [34]Jeffrey Mogul <mogul@pa.dec.com> ntpttrace utility

32. [35]Tom Moore <tmoore@fievel.daytonoh.ncr.com> i386 svr4 port

33. [36]Kamal A Mostafa <kamal@whence.com> SCO OpenServer port

34. [37]Derek Mulcahy <derek@toybox.demon.co.uk> and [38]Damon Hart-Davis <d@hd.org> ACRON MSF clock driver

35. [39]Rainer Pruy <Rainer.Pruy@informatik.uni-erlangen.de> monitoring/trap scripts, statistics file handling

36. [40]Dirce Richards <dirce@zk3.dec.com> Digital UNIX V4.0 port

37. [41]Wilfredo Sánchez <wsanchez@apple.com> added support for NetInfo

38. [42]Nick Sayer <mrapple@quack.kfu.com> SunOS streams modules

39. [43]Jack Sasportas <jack@innovativeinternet.com> Saved a Lot of space on the stuff in the html/pic/ subdirectory

40. [44]Ray Schnitzler <schnitz@unipress.com> Unixware1 port

41. [45]Michael Shields <shields@tembel.org> USNO clock driver

42. [46]Jeff Steinman <jss@pebbles.jpl.nasa.gov> Datum PTS clock driver

43. [47]Harlan Stenn <harlan@pfcs.com> GNU automake/autoconfigure makeover, various other bits (see the ChangeLog)

44. [48]Kenneth Stone <ken@sdd.hp.com> HP-UX port

45. [49]Ajit Thyagarajan <ajit@ee.udel.edu> IP multicast/anycast support

46. [50]Tomoaki TSURUOKA <tsuruoka@nc.fukuoka-u.ac.jp> TRAK clock driver

47. [51]Paul A Vixie <vixie@vix.com> TrueTime GPS driver, generic TrueTime clock driver

48. [52]Ulrich Windl <Ulrich.Windl@rz.uni-regensburg.de> corrected and validated HTML documents according to the HTML DTD

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