Recording
via the Net

Replay
via the Net .

Search
via the Net.

Small-scaled video recording server

Network Digital Recorder(NDR)
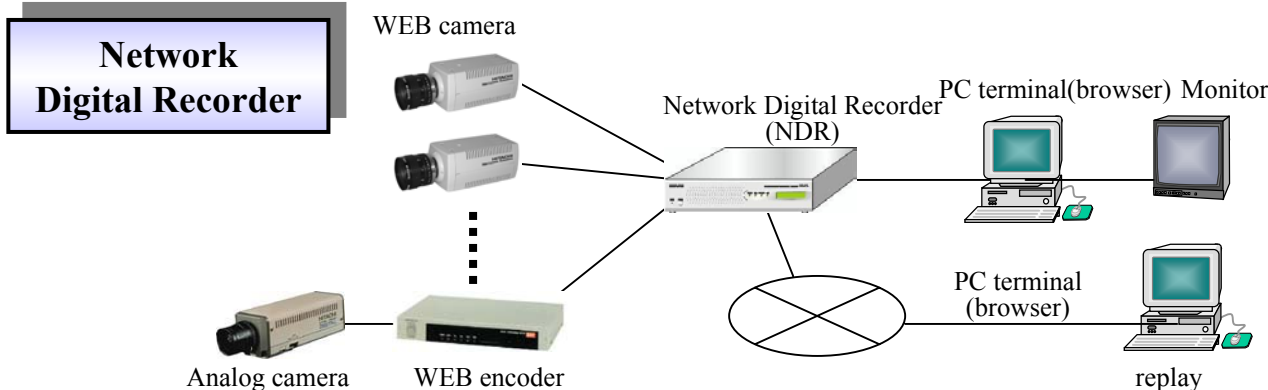
Display
via the Net

Transmission
via the Net

1. Outline of NDR(Network Digital Recorder)

1.1 Trend of CCTV image record system

VTR

Analog camera

Frame switcher | VTR for long hours | Monitor
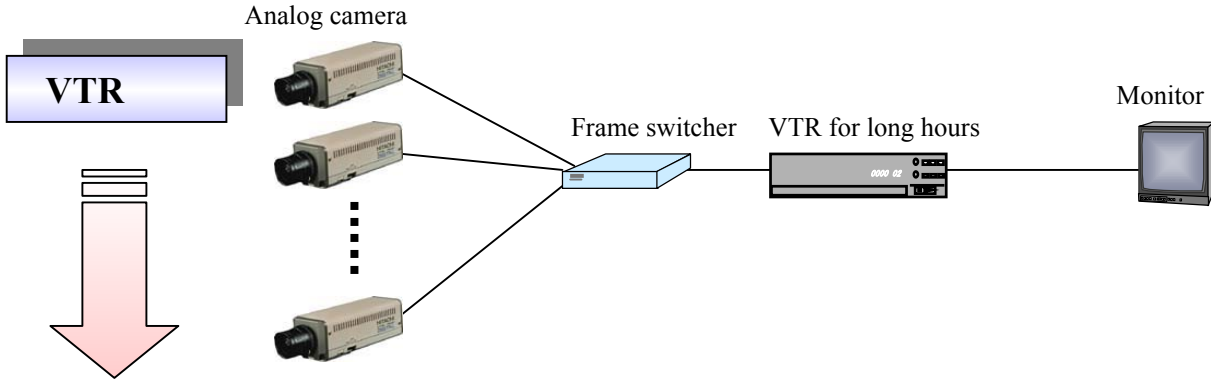
・frame skipping recording
・image quality degradation.
・difficulty of remote monitor .

Hard disk Recorder

Analog camera
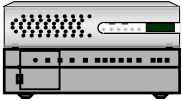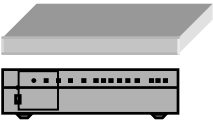
Hard disk recorder | Monitor

PC terminal

Download replay
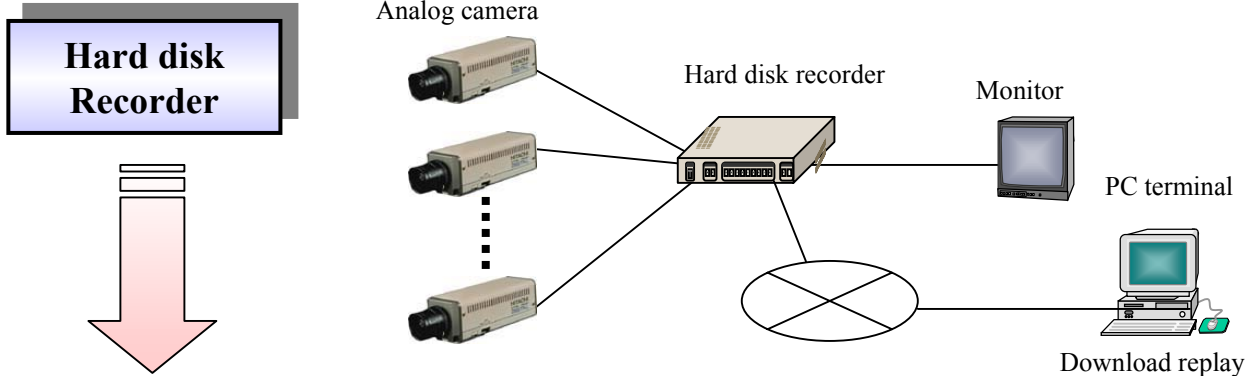
・frame skipping recording
・Image quality improvement
 reliability improvement by HD
・limited distance from cameras
・difficulty of remote monitor

Network Digital Recorder

WEB camera

Network Digital Recorder (NDR) | PC terminal(browser) Monitor

PC terminal (browser)

Analog camera | WEB encoder | replay

・full frame recording
(high-speed processing)
・image quality is selectable
・multi point monitoring
・full frame monitoring
・high speed down load

2

Generation	2nd generation			1st generation
Composition	SR-N120	SR-N120H2	SR-N120H3 +RAID5	Sever+ RAID5
Hard disk	250GB	600GB (300GBx2)	3.5TB (RAID5)	Max.20TB
Max.Rec.rate	120fps(VGA) 360fps(QVGA)			500fps(VGA)
Max.camera	16	16	16	100
Max.client	16	16	16	100

1.Large-scale storage system

Scale:100 to 1000 cameras
Usage: ASP(Application Service Provider)

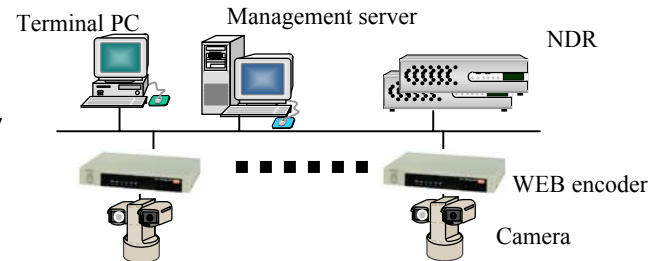Data center
NDR

The Internet

monitoring various areas
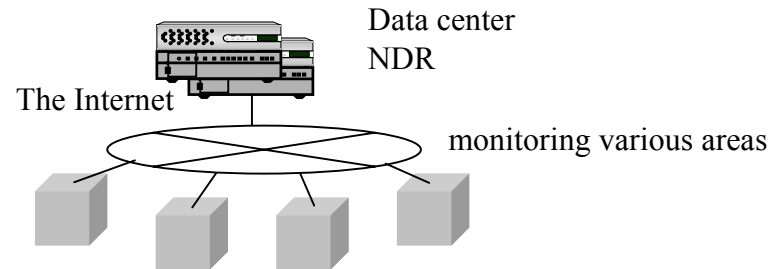
2.Medium-scale accumulation system

Scale: 16 to100 cameras
Usage: for electric power company and railway company
It could be custom-made. (goods for order)

Terminal PC
Management server
NDR

WEB encoder
Camera

3.Small-scale storage system (NDR)

Scale: 1 to 16 cameras
Composition: Management and storage all-in-one device
Usage: Multiple stores, parlor, ATM, and parking lot
It applies to as wide a field as possible.(catalog goods)

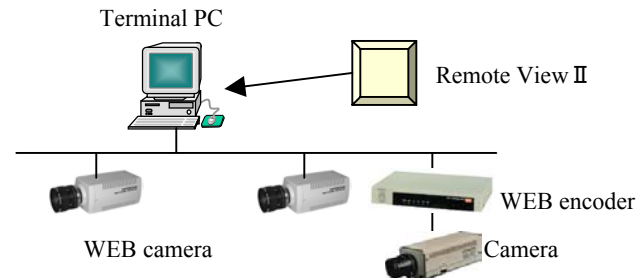Terminal PC
NDR

WEB encoder
WEB camera
Camera
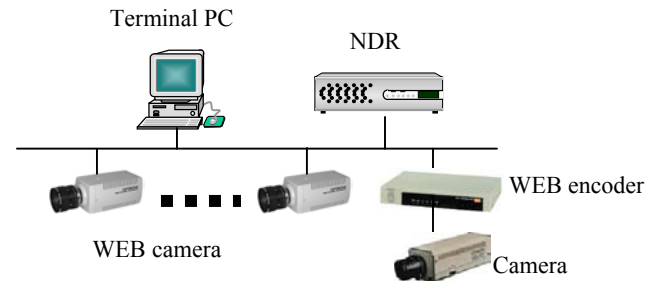
4.Simple storage system

Scale: 1 to 5
Composition:recording soft(RemoteView Ⅱ) in the PC
Usage: Small-scale shop etc.

Terminal PC
Remote View Ⅱ

WEB encoder
WEB camera
Camera

4

Private demands

Chain shop
Convenience shop

Public demands

Railway surveillance

High way surveillance

Power plant premises surveillance

Uninhabited substation

Illegal disposal surveillance

Monitoring in the   office

In-bank shop

Uninhabited ATM

Consumer credit

Uninhabited parking lot

Apartment house

Public management gambling place

Point
Place anywhere monitoring via the Net is necessary

1.5 First generation NDR (medium-scaled storage & distribution server)

Here shows the image storage system of the office of Arakawa under the control of Ministry of Land

Outline of system

About 80 cameras
CCTV equipment
ENC
ENC
Terminal PC
Management server
Storage server
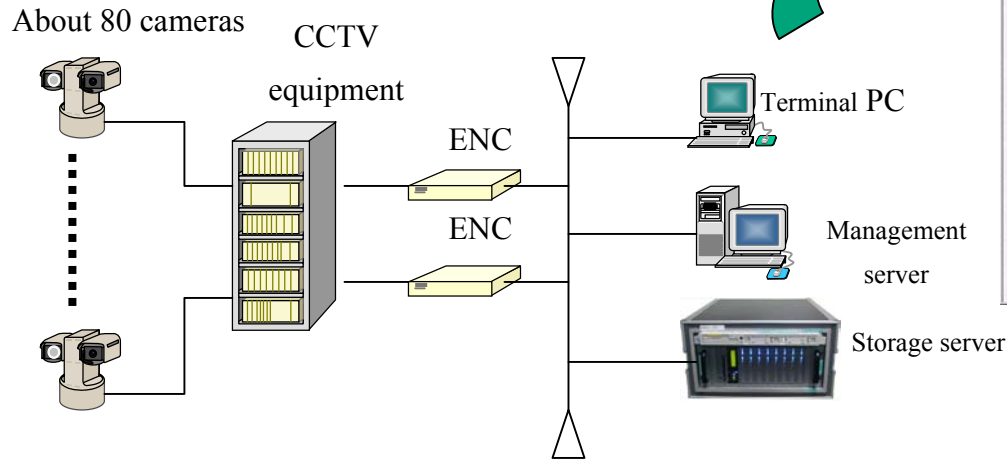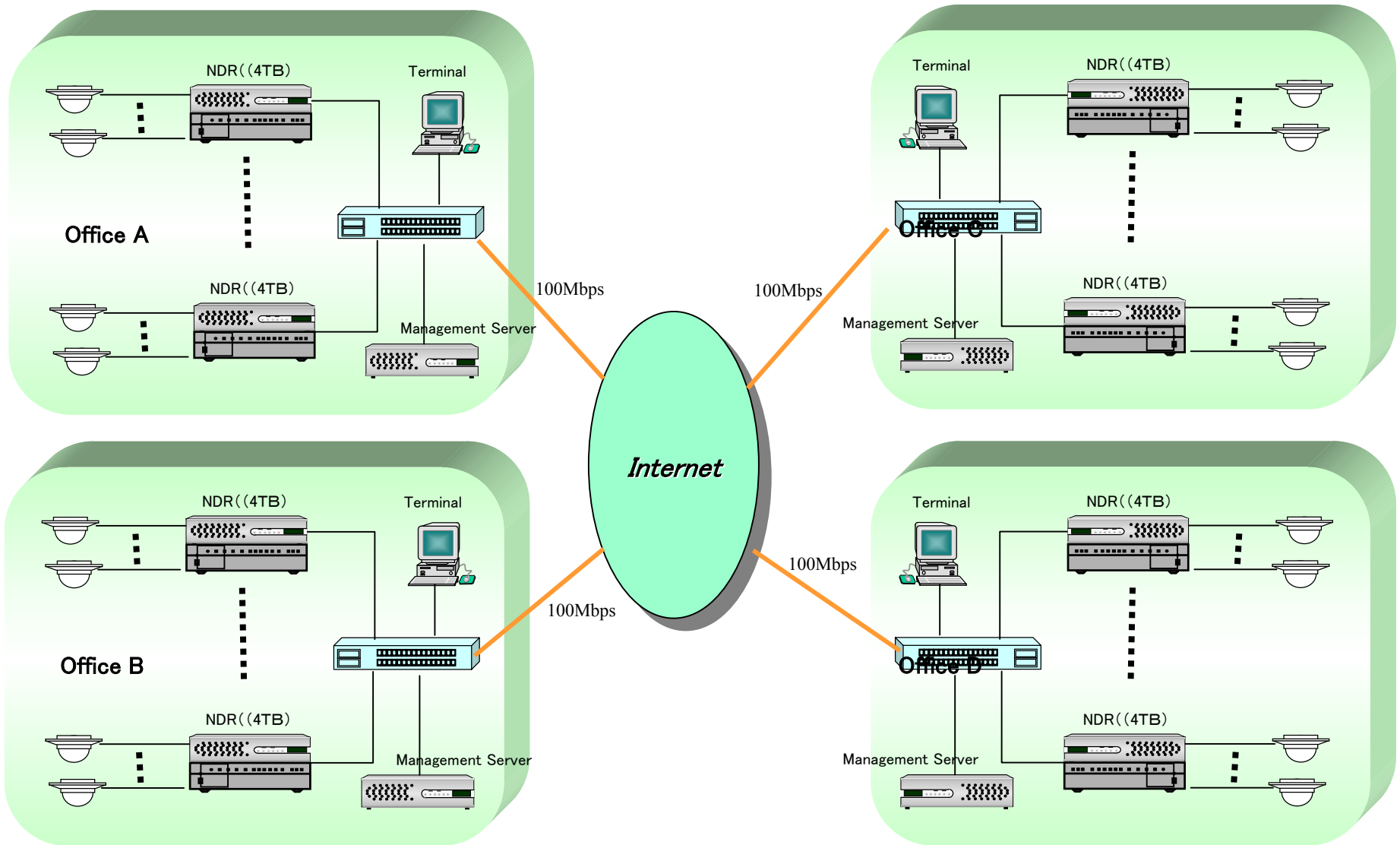
Other delivery results

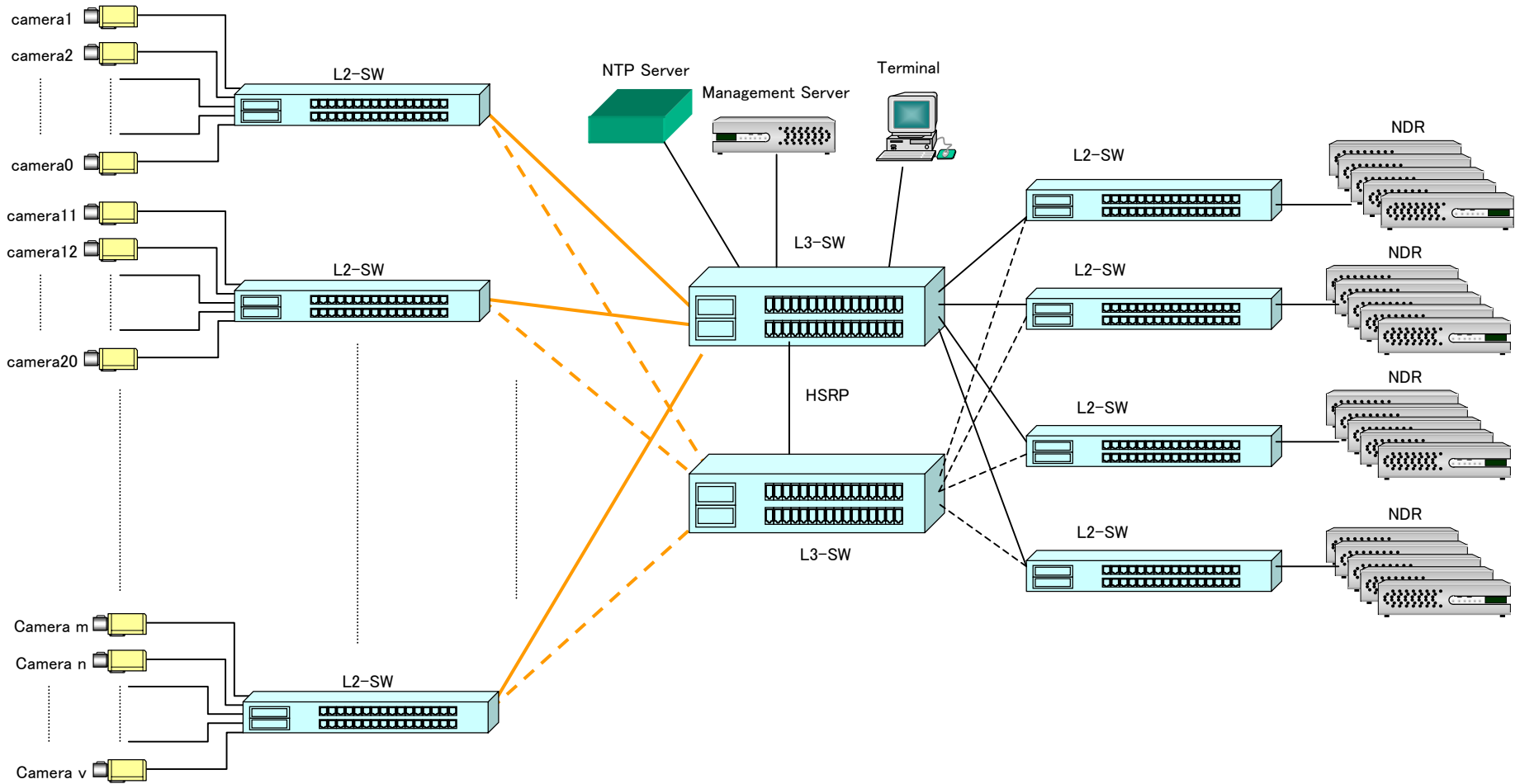・Akita river road office under of Ministry of Land (delivered)

・Communication Research Laboratory (delivered)

・Kasumigaura river office (delivered)

・Saeki river office under the control of Ministry of Land (delivered)

・Ground Self-Defense Force (delivered)

・Sea Self-Defense Force (delivered)

・New Tokyo International Airport public corporation (delivered)

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1.6 2nd generation NDR system (Commercial Bank)

Office A

NDR（4TB）
NDR（4TB）
Terminal
Management Server

Office B

NDR（4TB）
NDR（4TB）
Terminal
Management Server

Internet

100Mbps
100Mbps
100Mbps
100Mbps

Office C

Terminal
NDR（4TB）
NDR（4TB）
Management Server

Office D

Terminal
NDR（4TB）
NDR（4TB）
Management Server

7

Camera Approx. 800sets
NDR Approx. 400sets

camera1

camera2

camera0

L2-SW

NTP Server

Management Server

Terminal

camera11

camera12

camera20

L2-SW

L3-SW

HSRP

L3-SW

L2-SW

NDR

L2-SW

NDR

L2-SW

NDR

L2-SW

NDR

Camera m

Camera n

Camera v

L2-SW

Front panel

HITACHI NETWORK DIGITAL RECORDER SR-N120 NDR

POWER ACCESS ERROR FULL LINK/ACT 100M
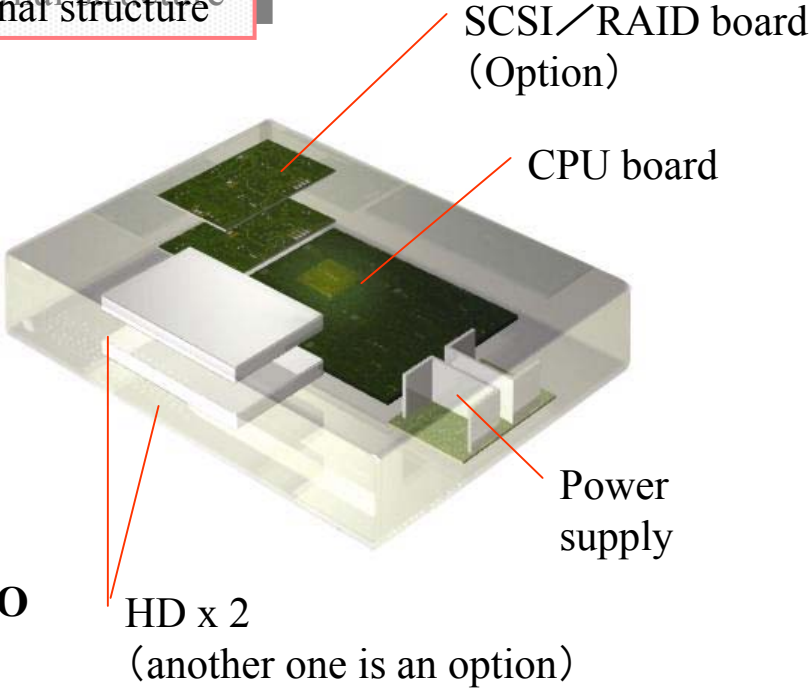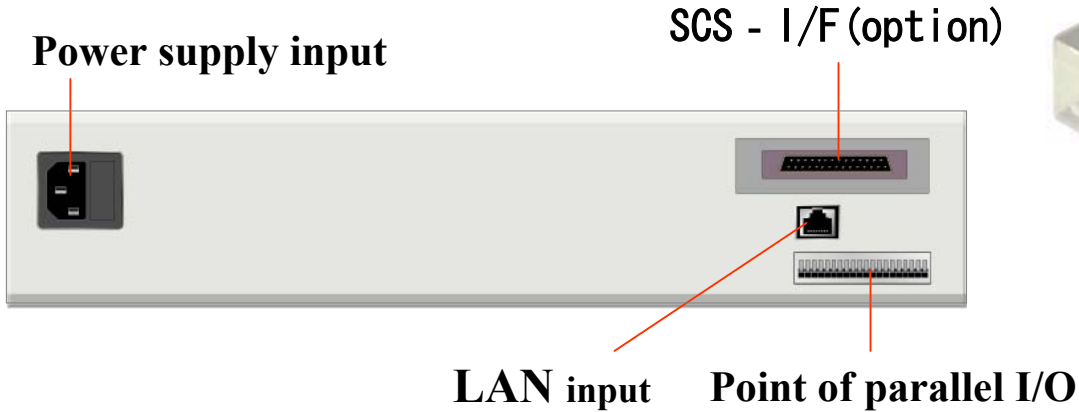
Point
・The rack can be stored by 19 inches.
・One 250GB or Two 300GB hard disk can be built in.
・External hard disk can be extended with the option board.

Internal structure

The back panel

SCSI/RAID board
（Option）

CPU board

Power supply input

SCS - I/F(option)

Power supply

LAN input   **Point of parallel I/O**

HD x 2
（another one is an option）

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HITACHI

ACCESS　ERROR　FULL　POWER

HDD

POWER

NETWORK DIGITAL RECORDER NDR SR-N000
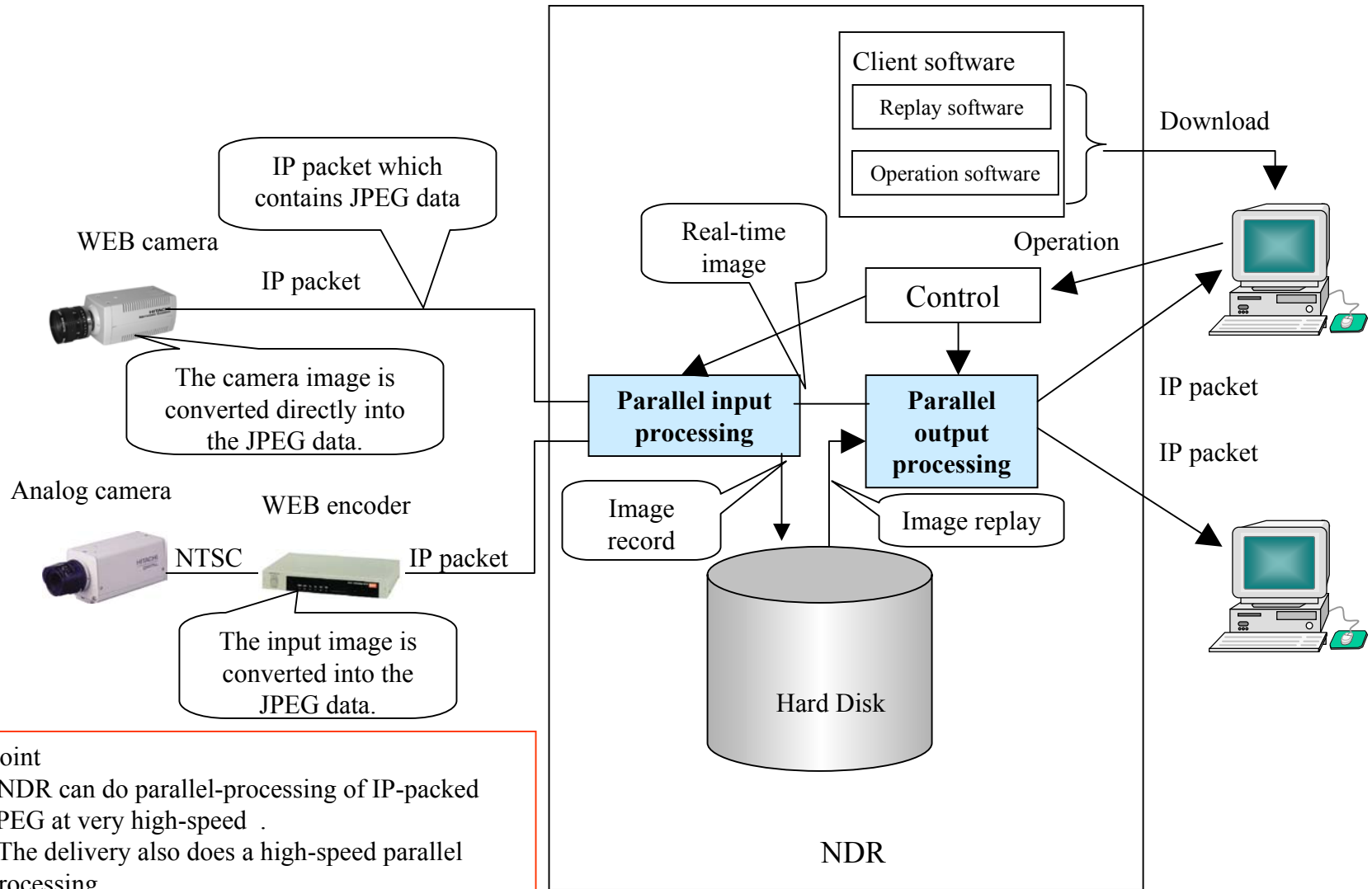
- Large hard disk   :160GB

- Recording channels   :16ch for 8 cameras

- High performance   :300fps in total

- Compact size   :approx. 1/3 compared to present model

- Export oriented   :Clearing CE,FCC etc regulations
                             Fits to multi-language environment

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1.9 Comparison of NDR

Item	2nd gen. NDR Spec.	3rd gen. NDR Spec. Draft
HD Capacity	250GB	160GB
No. of Record Ch	16ch	16ch for 8 cameras
Record refresh rate	360fps	300fps
Compression	MJPEG	MJPEG
Audio Compression	N.A.	N.A.
OS・Apri. Soft Storage	Compact Flash（CF）	Compact Flash（CF）
Anti-Vibration	Very good	Good
LCD Display	Avail.	N.A.
Sensor in-outputs	Avail.	N.A.
SCSI Board I/F	Avail.	N.A.
Export Version	N.A.	CE, FCC、Multi-Language
Size	420x88x340mm	290x60x250mm？
Weight	8kg	3.5kg？
Power Consumption	35W	35W？
Ambient temperature	5～40℃	5～40℃

1.10　Principle of NDR

IP packet which contains JPEG data

Client software

Replay software

Operation software

Download

WEB camera

IP packet

Real-time image

Operation

Control

The camera image is converted directly into the JPEG data.

IP packet

Parallel input processing

Parallel output processing

IP packet

Analog camera

WEB encoder

NTSC

IP packet

Image record

Image replay

The input image is converted into the JPEG data.

Hard Disk

NDR
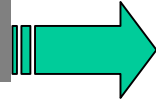
Point
・NDR can do parallel-processing of IP-packed JPEG at very high-speed .
・The delivery also does a high-speed parallel processing.
・A real-time image is also delivered.
・Software for the terminal is stored in NDR and downloaded to a terminal PC as needed.
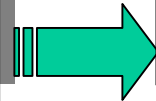
12

2. Feature of NDR(1/2)

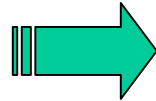**Record and replay High-speed processing** →

Recording speed　　　　　:　300fps(320x240)
Number of max. client　　:　16ch(Only in usual recording)

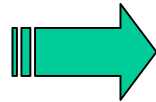**Real-time monitoring via the Net** →

live images and the recording image can be replayed via the Net.
Monitoring simultaneously in multiple places.

Controllable via the Net. →

All of the functions in NDR can be remote-controlled via the Net.
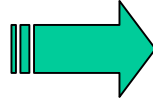Also,cameras are controllable via the WEB encoder.

Download via the Net. →

The recording image is downloaded to HD of terminal PC or media.
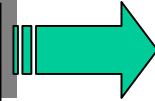
2. Feature of NVR(2/2)

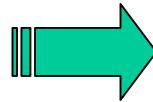**Alarm recording** ➡️ pre-alarm , post-alarm recording
The thumbnail of the alarm recording is displayed.

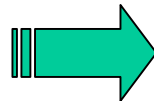**Synchronization system Display** ➡️ 4 screens can be synchronized, and also not synchronized.

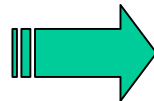**Synchronization of usual mode And alarm mode** ➡️ If alarm image is recorded in higher frame rate,one screen which displays usual mode automatically switch to alarm mode.

Multi Language operation ➡️ Post -alarm recording when there is sensor input in main body of NDR can be added.
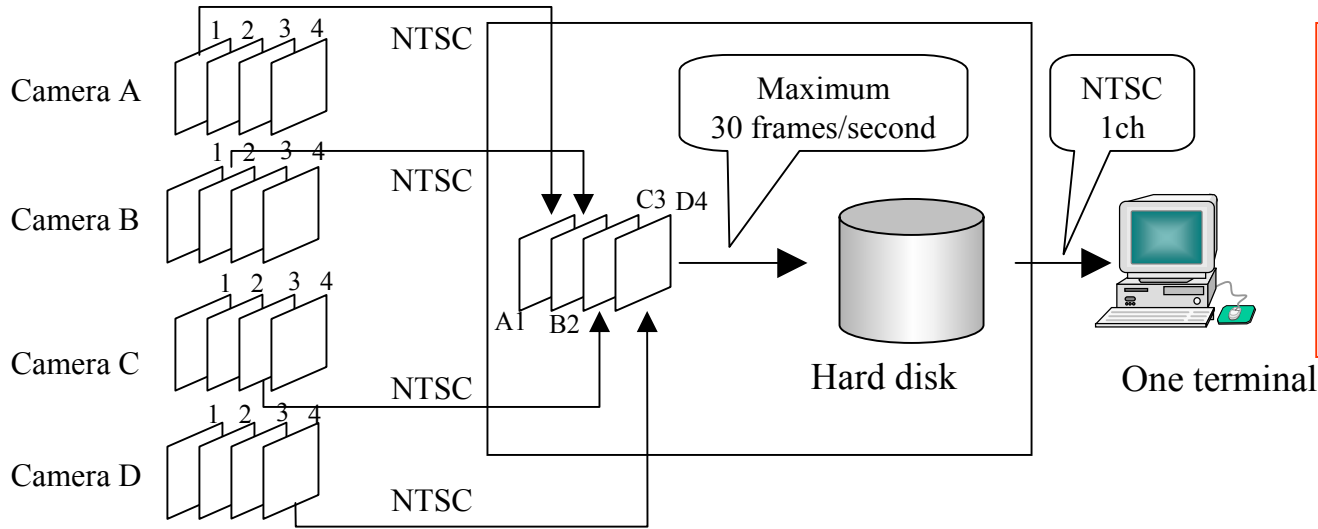
Analog output Function(option) ➡️ If you install a graphic board and software in the terminal, the (NTSC) signal of the analog can be output.

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2.1 High-speed processing of recording and replay

Previous type VTR or hard disk recorder

Camera A 1 2 3 4 NTSC

Camera B 1 2 3 4 NTSC C3 D4

A1 B2

Camera C 1 2 3 4 NTSC

Camera D 1 2 3 4 NTSC

Maximum 30 frames/second

Hard disk

NTSC 1ch

One terminal

Points
The frame is selected one by one in the case of multiple recording.

・maximum 30fps record
・Only 1ch replay

Network digital recorder

Camera A 1 2 3 4 IP packet

Camera B 1 2 3 4 IP packet

Camera C 1 2 3 4 IP packet

Camera D 1 2 3 4 IP packet

Parallel input process

Maximum 300 frames/second

Hard disk

Parallel output processing

16ch or less

16ch or less
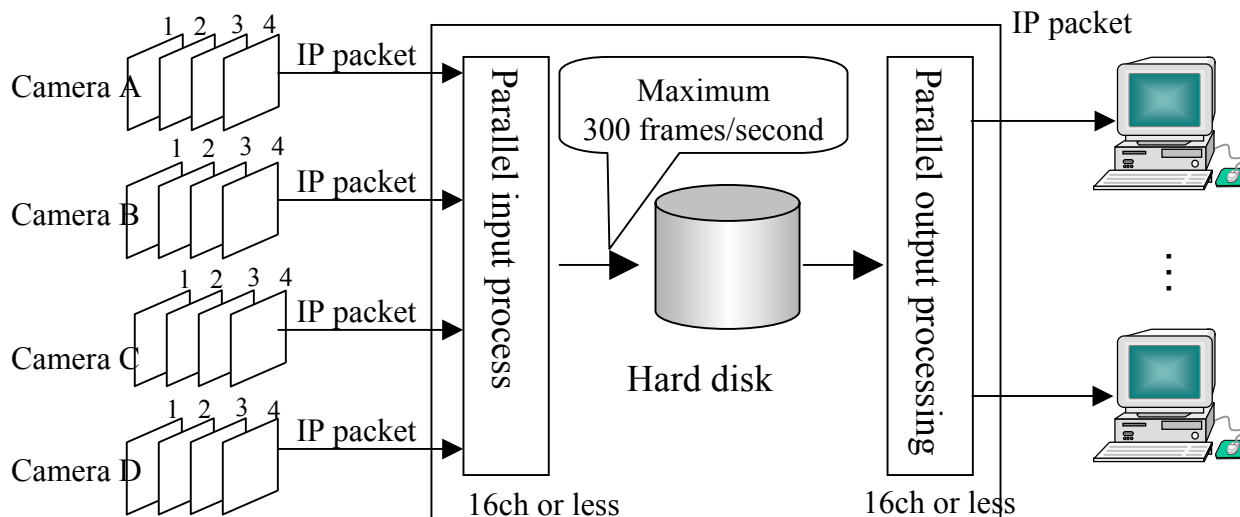
IP packet

Points
parallel processing for IP packets is done in the case of multiple recording.

・maximum 300fps record
・maximum 16ch

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2.2 Monitoring of live image via the Net
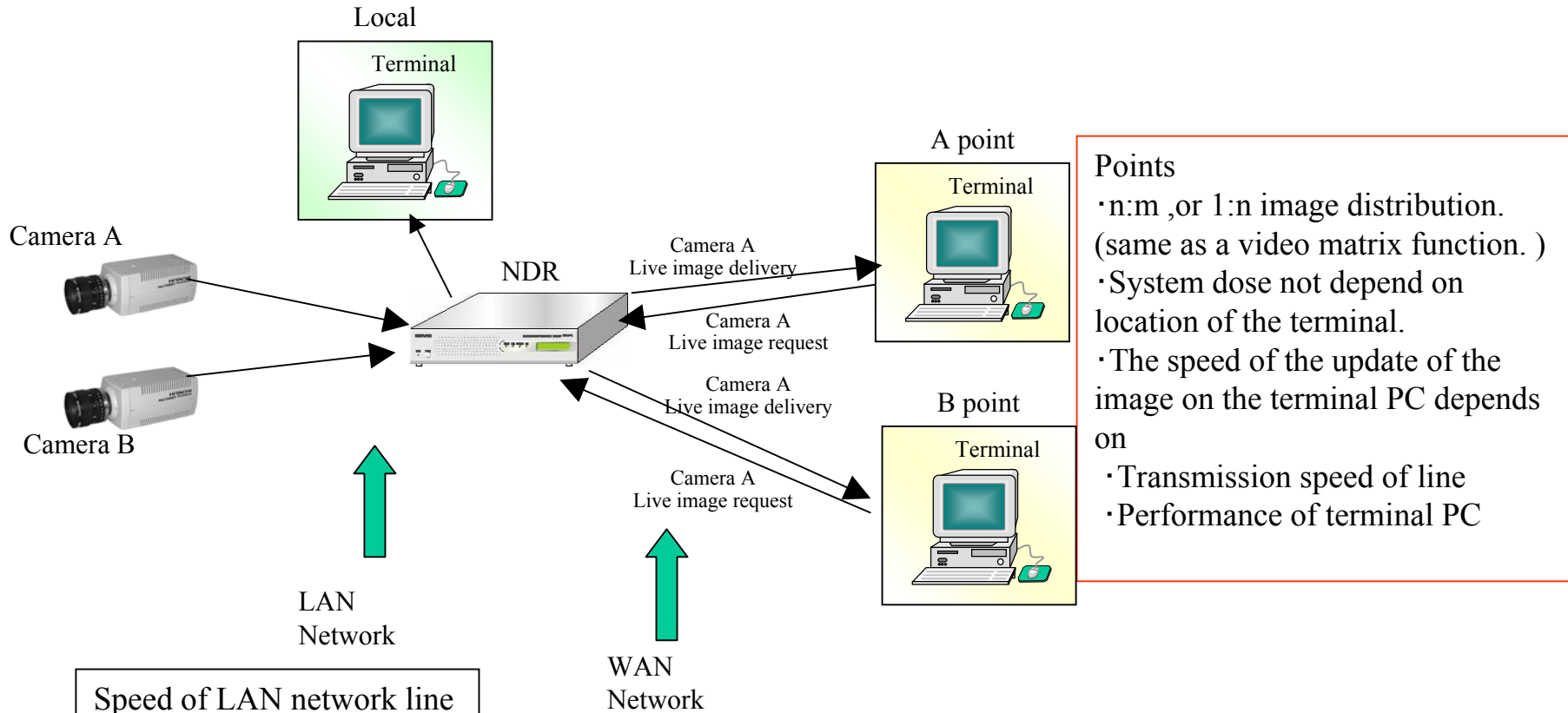
A live image can be monitored in LAN or via the WAN network.

Local
Terminal

A point
Terminal

Camera A

NDR

Camera A
Live image delivery

Camera A
Live image request

Camera B

Camera A
Live image delivery

B point
Terminal

Camera A
Live image request

Points
・n:m ,or 1:n image distribution.
(same as a video matrix function.)
・System dose not depend on
location of the terminal.
・The speed of the update of the
image on the terminal PC depends
on
 ・Transmission speed of line
 ・Performance of terminal PC

LAN
Network

WAN
Network

Speed of LAN network line
100Base-TX
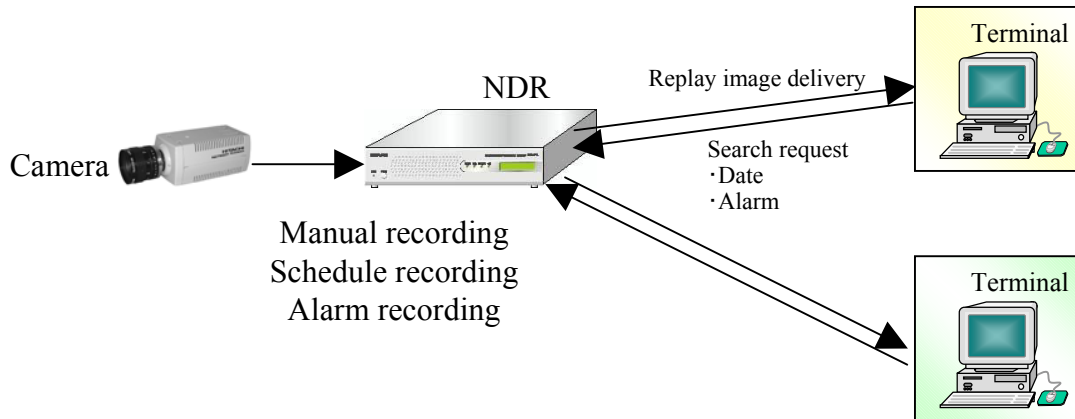
Standard at speed of WAN network line
(execution speed)
ISDN   128kbps
ADSL   200〜300kbps(going up)
B Flets   20〜30Mbps

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2.3 Recording and replay image via the Net

Image recording and replay flow

Camera → NDR

NDR → Replay image delivery → Terminal

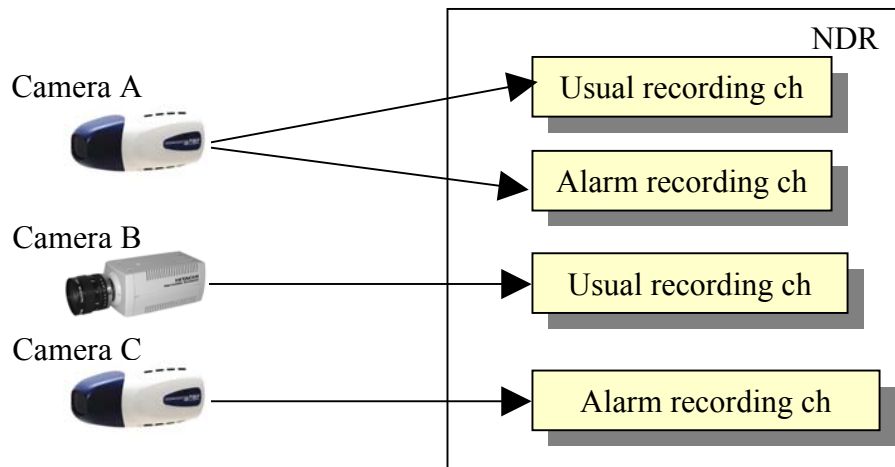Search request
・Date
・Alarm

Manual recording
Schedule recording
Alarm recording

Terminal

Points
・It's possible to record by the the manual operation, by the schedule or by the alarm.
・Date-search request or alarm-all-showed request are send from PC to NDR, it replay from the designated image.

Recording pattern

NDR

Camera A → Usual recording ch
→ Alarm recording ch

Camera B → Usual recording ch
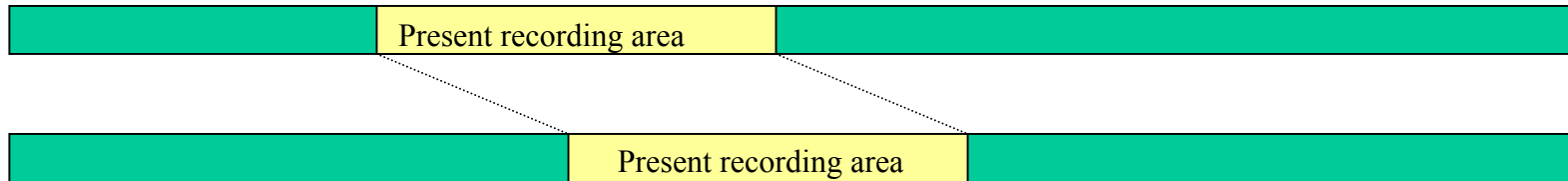
Camera C → Alarm recording ch

Points
・Three patterns of recording.
(Manual recording,Schedule recording,Alarm recording,)
・Each camera can select a pattern individually.
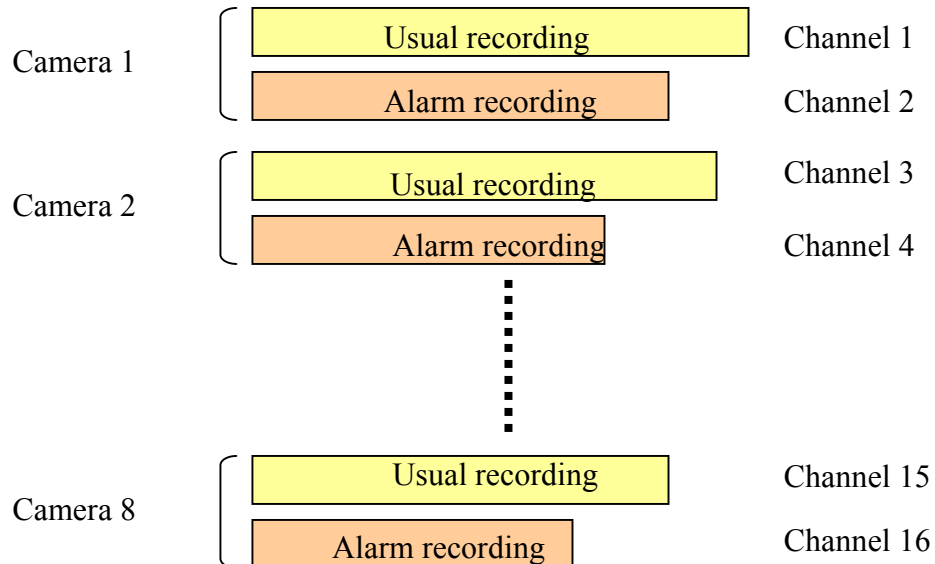
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2.4 Recording principle and channel allocation

Recording principle

Virtually continues frame numbers are given

	Present recording area	

	Present recording area	

As time goes by, present recording area moves

Channel allocation

Camera 1
- Usual recording — Channel 1
- Alarm recording — Channel 2

Camera 2
- Usual recording — Channel 3
- Alarm recording — Channel 4

Camera 8
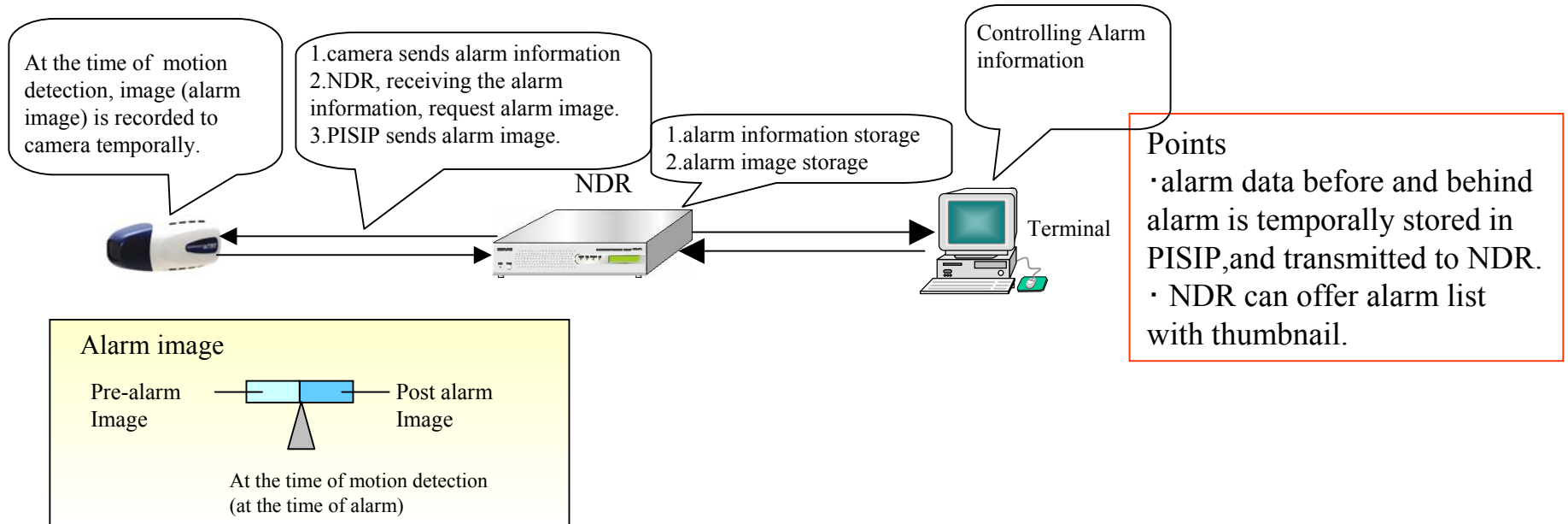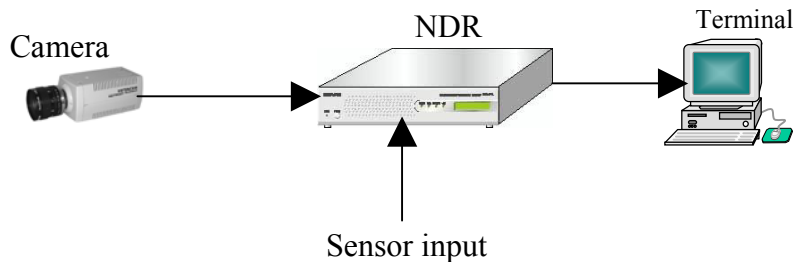- Usual recording — Channel 15
- Alarm recording — Channel 16

Points
・Capacity of each channel can vary depending on necessary recording time.
・Even in alarm only mode, min. capacity should be allocated for live picture.

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2.5 Alarm recording

Pre-Post alarm recording mode

At the time of motion detection, image (alarm image) is recorded to camera temporally.

1.camera sends alarm information
2.NDR, receiving the alarm information, request alarm image.
3.PISIP sends alarm image.

1.alarm information storage
2.alarm image storage

Controlling Alarm information

NDR

Terminal

Points
・alarm data before and behind alarm is temporally stored in PISIP,and transmitted to NDR.
・ NDR can offer alarm list with thumbnail.

Alarm image

Pre-alarm Image　　　　Post alarm Image

At the time of motion detection
(at the time of alarm)

Post alarm recording mode(only for 2nd gen. NDR)

Camera　　　　NDR　　　　Terminal

Sensor input

Point
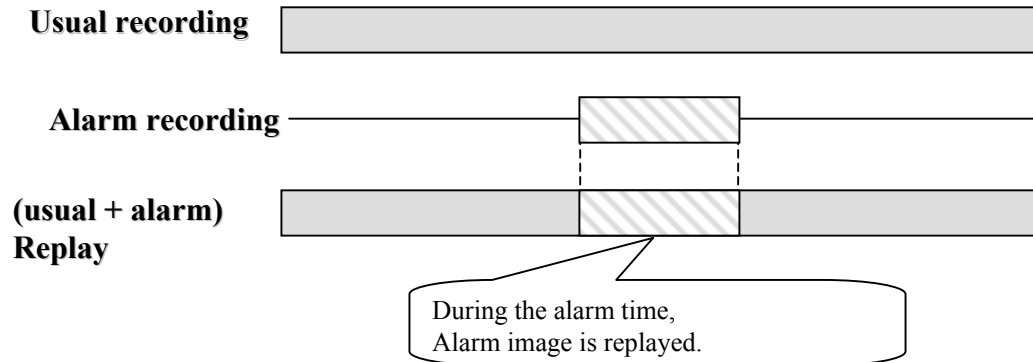In the case of sensor input to main body of NDR・・・

・during usual recording: Frame rate is designated.
I
・when the recording is off:NDR starts recording at designated frame rate.

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2.6 Relay function

Seamless replay function

Usual recording

Alarm recording

(usual + alarm) Replay

During the alarm time,
Alarm image is replayed.

Point
・Usual recording is on,while alarm recording is on.
・During alarm period,NDR replay alarm image automatically.
・ Using seamless replay function,you can see synchronized image of usual recording and alarm recording.

4 screen synchronization and asynchronous replay

A

B

C

D

A ▷	B ▷▷
C ◁◁	D ☐
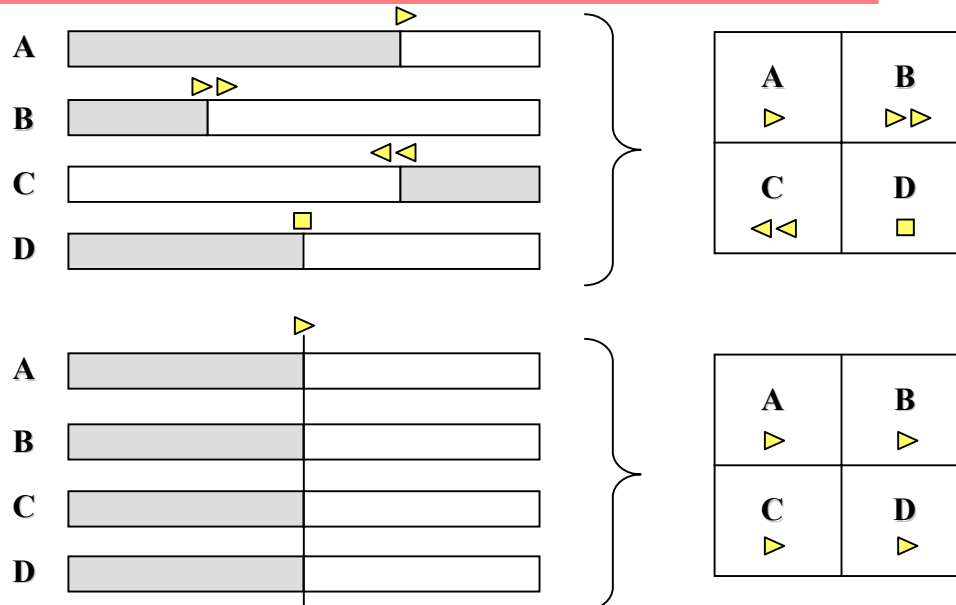
Point
4 screens can be totally treated as different recorder in the asynchronous mode.

A

B

C

D

A ▷	B ▷
C ▷	D ▷

Point
 4 screens can be synchronized in synchronous mode.

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2.7 Scanning replay

The scanning replay is a function to change scenes to display.
The scanning of 1 screen and the scanning of 4 screens are also possible.

Point
・Selection of arbitrary camera and 4 screen pattern.
・Setting of scanning time
・Selection of four 1 screen/ 4 screen.

One screen scanning

You select 1 screen.

You can select an arbitrary camera.

You can select switching time.

The scanning replay starts.

| Cam.sel | Quad patterns | Auto Scan | Rec.all | Alm display | | Cam.ope |

Single [1] [2] [3] [4] [ ] [ ] [ ] [ ]   Switching   Scan

Quad [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]   5 ▼ Sec.   Stop

1 → 3 → 5

Four screen scanning

Pattern 1   Pattern 2   Pattern 3

You can select an arbitrary camera pattern.
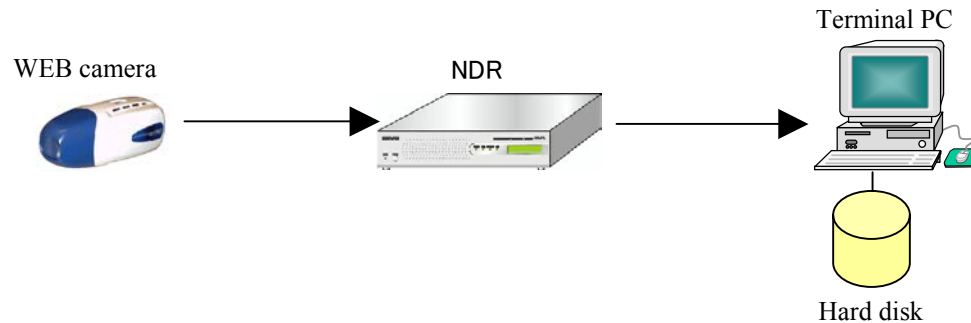
You select 4 screen.

| Cam.sel | Quad patterns | Auto Scan | Rec.all | Alm display | | Cam.ope |

1 2
3 4
pattern1

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2.8 Download of image data

When you download it to a local disk of terminal PC

Terminal PC

WEB camera

NDR
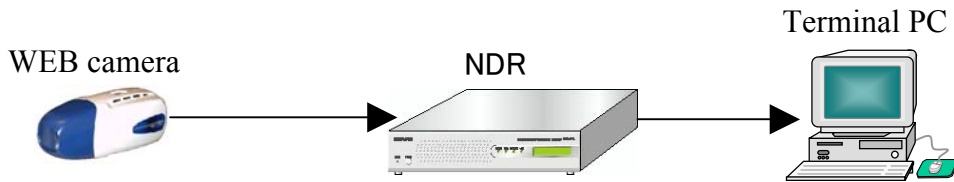
Hard disk

Points
・Down load to local disk,
 DVD-RAM or MO.
・Replay the image in PC by
using special software.
・Down load to CD-R/RW or
 DVD-RW via Hard disk

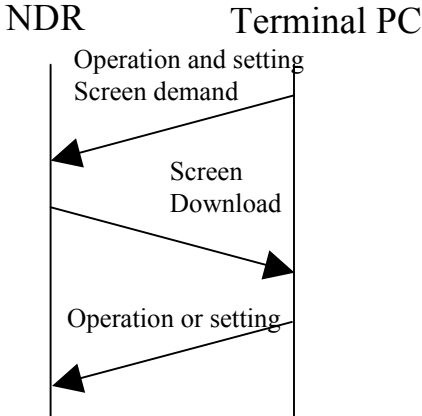## When you download it to the removable mass storage of terminal PC

Terminal PC

WEB camera

NDR

Hard disk

CD-R/DVD

Another PC

Starting Point	▶▶ Set ▶▶	— — , —
	◀◀ Jump ◀◀	— · — · —
Terminal Point	▶▶ Set ▶▶	— — , —
	◀◀ Jump ◀◀	— · — · —
Recording Place		Reference
Comment		
camera1		Set
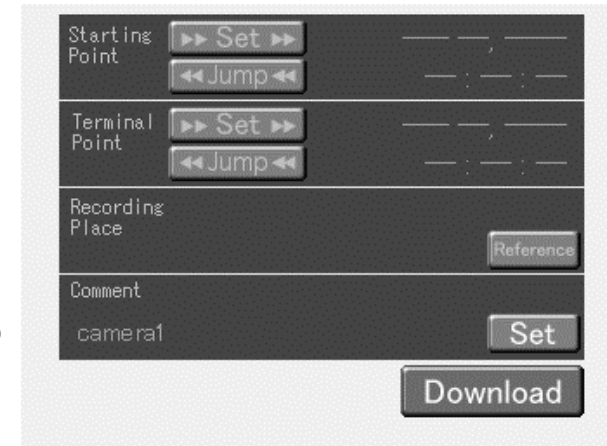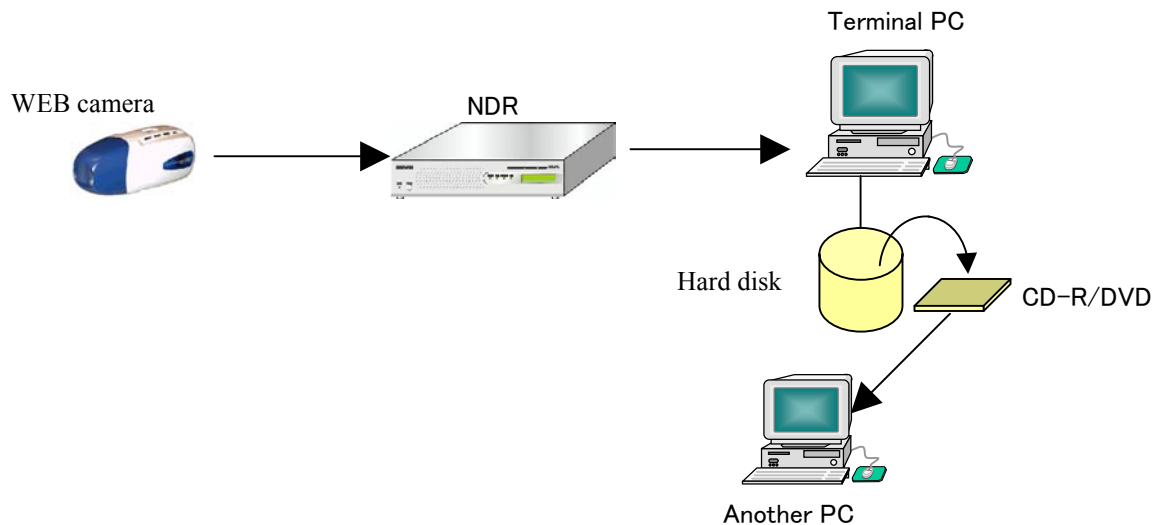
Download

2.9 NDR control and camera control

Control of NDR

WEB camera   NDR   Terminal PC

Point
・The operation and the
setting of NDR can be
done from the terminal.

NDR   Terminal PC

Operation and setting
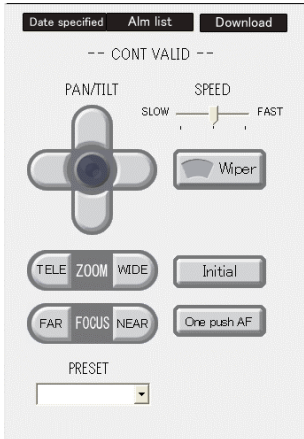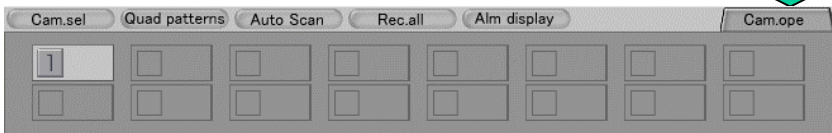Screen demand

Screen
Download

Operation or setting

Points
・ Camera control software will
be down loaded from NDR
・The software controls PTZ
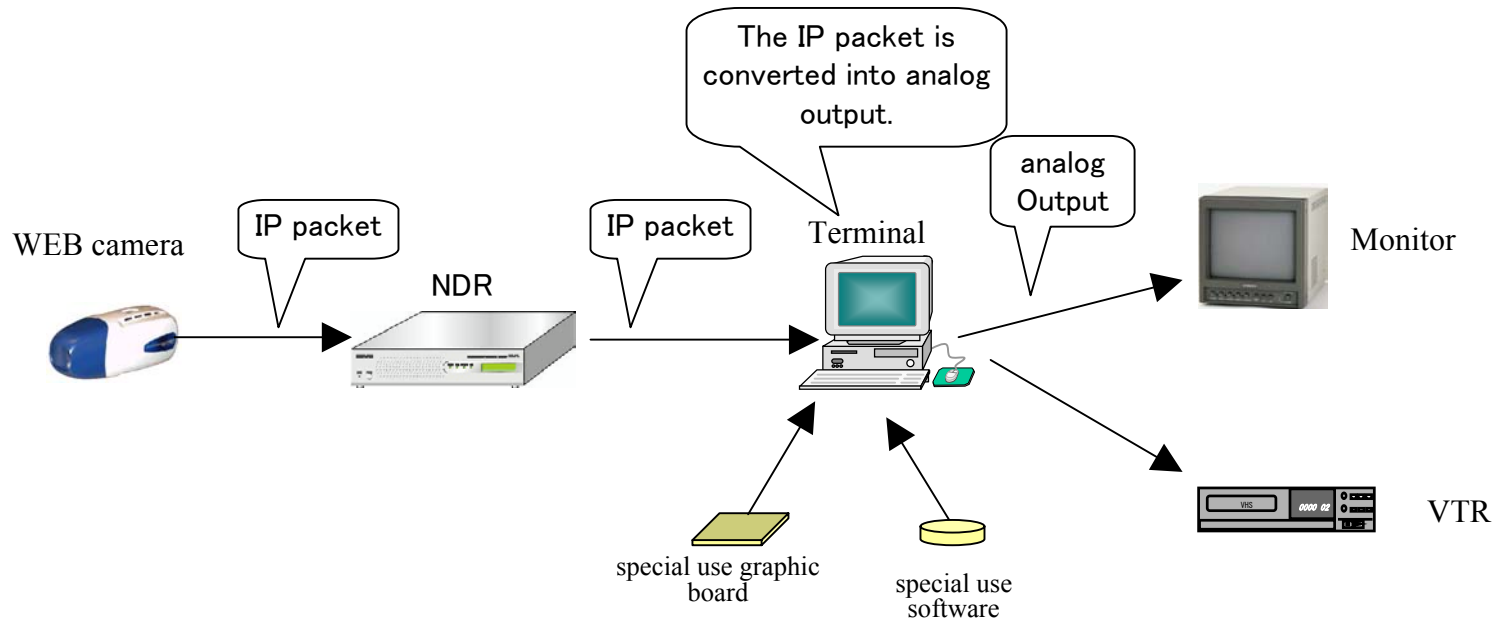cameras via WEB encoder.

Control of camera

PTZ camera   NDR

WEB encoder   Terminal
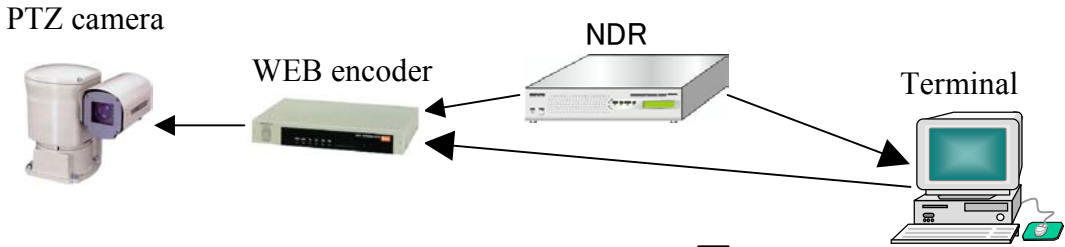
Camera operation screen selection

| Cam.sel | Quad patterns | Auto Scan | Rec.all | Alm display | Cam.ope |

| Date specified | Alm list | Download |

-- CONT VALID --

PAN/TILT   SPEED
SLOW ——|—— FAST

Wiper

TELE ZOOM WIDE   Initial

FAR FOCUS NEAR   One push AF

PRESET

2.10 Analog output function(option)

The output of the analog can be put out from NDR with an option.
It is possible to connect it with monitor and VTR.

The IP packet is converted into analog output.

analog Output

WEB camera | IP packet | NDR | IP packet | Terminal | Monitor

special use graphic board

special use software

VTR

Points
2 choices as
・Use a terminal PC which as analog output.
・Put a graphic board & software to generate analog output.

Image display part

Camera information display part

Alarm list display

Information operation part

Image operation part

Multi operation part

3.Example of system construction

3.1Composition of fixed camera system

Operation terminal

Fixed WEB camera

Fixed WEB camera

Fixed WEB camera

Fixed WEB camera

Hub

NDR
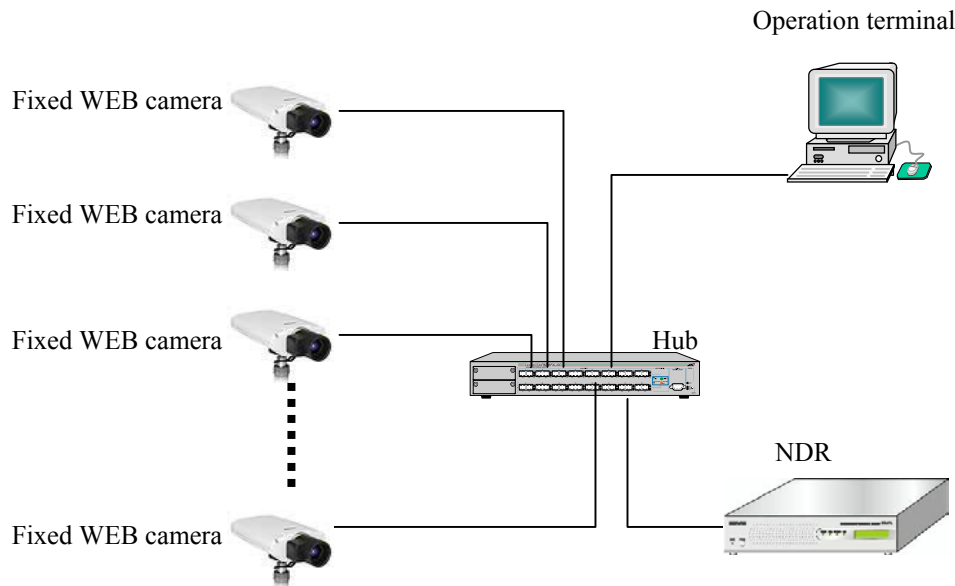
Point
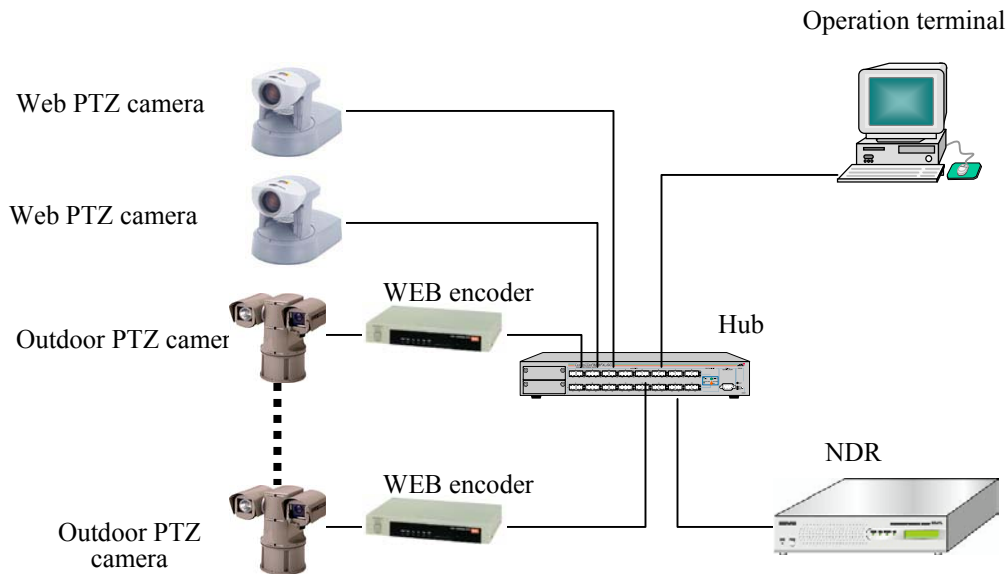**・target customer and market**
New equipment introduction customer
Convenience store and small-scale shop
Monitoring only in the shop
Wiring for network cable and power supply

・Feature and function
Maximum 16ch recording simultaneously.

	item	type	number
1	Fixed WEB camera		n
2	Switching Hub		1
3	Operation terminal		1
4	NDR		1

Operation terminal

Web PTZ camera

Web PTZ camera

WEB encoder

Outdoor PTZ camer

Hub

Outdoor PTZ
camera

WEB encoder

NDR

Point
・**Customer and market which becomes object**
New equipment introduction customer
Parking lot and factory
Monitoring .

・**Feature and function**
Maximum 16ch recording simultaneously.

	item	type	number
1	Web PTZ camera		n
2	Outdoor PTZ camera		n
3	WEB encoder		n
4	Switching HUB		1
5	Operating PC		1
6	NDR		1

4.Others

4.1 Consideration to reliability

·Single Board Computer
Improvement of reliability is achieved by using a general-purpose single board computer board.
Low power consumption brings you high reliability.

·Anti vibration mechanism
NDR is protected from the vibration and impact by adopting vibration and impact-protected mechanism.

·OS and application software on CF
Improvement of reliability is achieved by using a flash memory instead of HD to avoid HD crash
and to realize automatic startup.

·Squeezed Linux
The reliability securing of higher software is achieved by using Linux for OS.
Since unnecessary modules are taken out, it is strong against virus or worm.

4.2 Maintenance service

Unit of maintenance

Minimum unit for maintenance shall be as follows.
1) Consumable parts such as hard disk, fan, dry battery on CPU board.
2) CPU board
3) Power supply board or unit
4) Main unit except the parts above mentioned
5) Operation manual

Hard disk replacement

1) Every two year, Hard disk is recommended to replace.
2) Spare hard diskes will be supplied from Hitachi.
3) Formatting, installation & setting shall be done at your partner side.

5.1 Web equipment product line from Hitachi

Web camera

- KV-IP11
 - Complete animation output(30fps)
 - With built-in WEB server function

- KV-NC100
 - Equipped with image sensor
 - Image data encryption
 - Pre -post alarm function

- KP-N21
 - High sensitivity
 - setting can be set.

- HC-30
 - Outdoor camera platform all-in-one design

Web encoder

- PT-IP31T
 - Complete animation output(30fps)

- PT-IP150T
 - MPEG-4 and MJPEG simultaneous output