3G HD Low Bit Rate IPCamera Reference Design

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3G HD Low Bit Rate IPCamera Live View Method

SmartPhone or Tablet PC

Android Device uses VLC or MoboPlayer: open the Stream(rtsp://admin:xxxxx@fineimg.3322.org/ch1)
IOS Device uses GoodPlayer: open the Stream(rtsp://admin:xxxxx@fineimg.3322.org/ch1)

Desktop PC or Notebook PC

WIN Device uses VLC, open the Stream(rtsp://admin:xxxxx@fineimg.3322.org/ch1)

Notice: 1.Both VLC and MoboPlayer are free stream player, the effect of live view is same as GoodPlayer. Suggest using VLC first, www.videolan.org/vlc/. Please use the latest version stream player program.

2.Living stream is upload by DSL, the bandwidth of DSL can transmit one 720p stream only, so password(xxxxx) is requisite for best effect of live view, please contact Simon Xiao (simon.xiao@fineimg.com, 410369813@qq.com, 13902261438) to get it.

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- Background
- Functions
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- Networking
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- **Background**
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SmartPhone
Wireless 3G/4G
Goal
Limit

FineIMG

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SmartPhone
Wireless 3G/4G
Goal
Limit

- Sales Volume: over 0.6 billion only 2012.
- Display Screen: 3.5~5 inch, 800x480~1280x720 pixel.
- CPU: Dual cores or Quad cores, frequency over 1Ghz.
- Memory: 512KB~2G RAM, and 4~64G FLASH.
- Video: Decode H.264 over 800x480.

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SmartPhone

Wireless 3G/4G

Goal

Limit

- WCDMA: Download 14.4Mbps, Upload 5.76Mbps.
- CDMA2000: Download 3.1Mbps, Upload 1.8Mbps.
- TD-SCDMA: Download 2.8Mbps, Upload 384Kbps.
- Application: By test, 512Kbps download speed is availability.

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SmartPhone
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Goal
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- SOC Chip: FPGA (EP4CE115)
- H.264 Encoding: Main Profile with CABAC
- Encode capacity: 1280x720x25 fps
- Bit rate: <512Kbps
- Zoom: 1X~8X, Electron PTZ
- Video Analytics: Rate self-adaptive, Movement detection, Audio detection.
- Home alarm interface: 433M wireless
- Protocol: TCP, RTP, RTSP, DHCP, NTP, HTTP, FTP, SMTP, DDNS
- Remote upgrade: Configuration data and software of NIOS

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SmartPhone
Wireless 3G/4G
Goal
Limit

Functions	Base	Extend
Live view	●	●
Client video recording	●	●
Mailbox video recording	●	●
Playback	●	●
Analytics motion detection	●	●
Alarm notice	●	●
100M network	●	●
Small power OC DIO	●	●
WIFI		●
SD recording		●
Large power OC Driver		●
433M wireless		●

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SmartPhone
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Goal
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- ADSL is the best choice for camera to access internet and upload video. So bit rate must be restricted to 512Kbps or less, that is much less than 1~2Mbps of general bit rate at 1280x720x25fps.
- Actual bit rate will change in a wide range with the change of scene motion. Smart adaptive bit rate control is the key technology of achieving the best quality video under the limit of actual network bandwidth.

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Typical application
Live stream
Record
Playback
Intrusion Detect
Alarm

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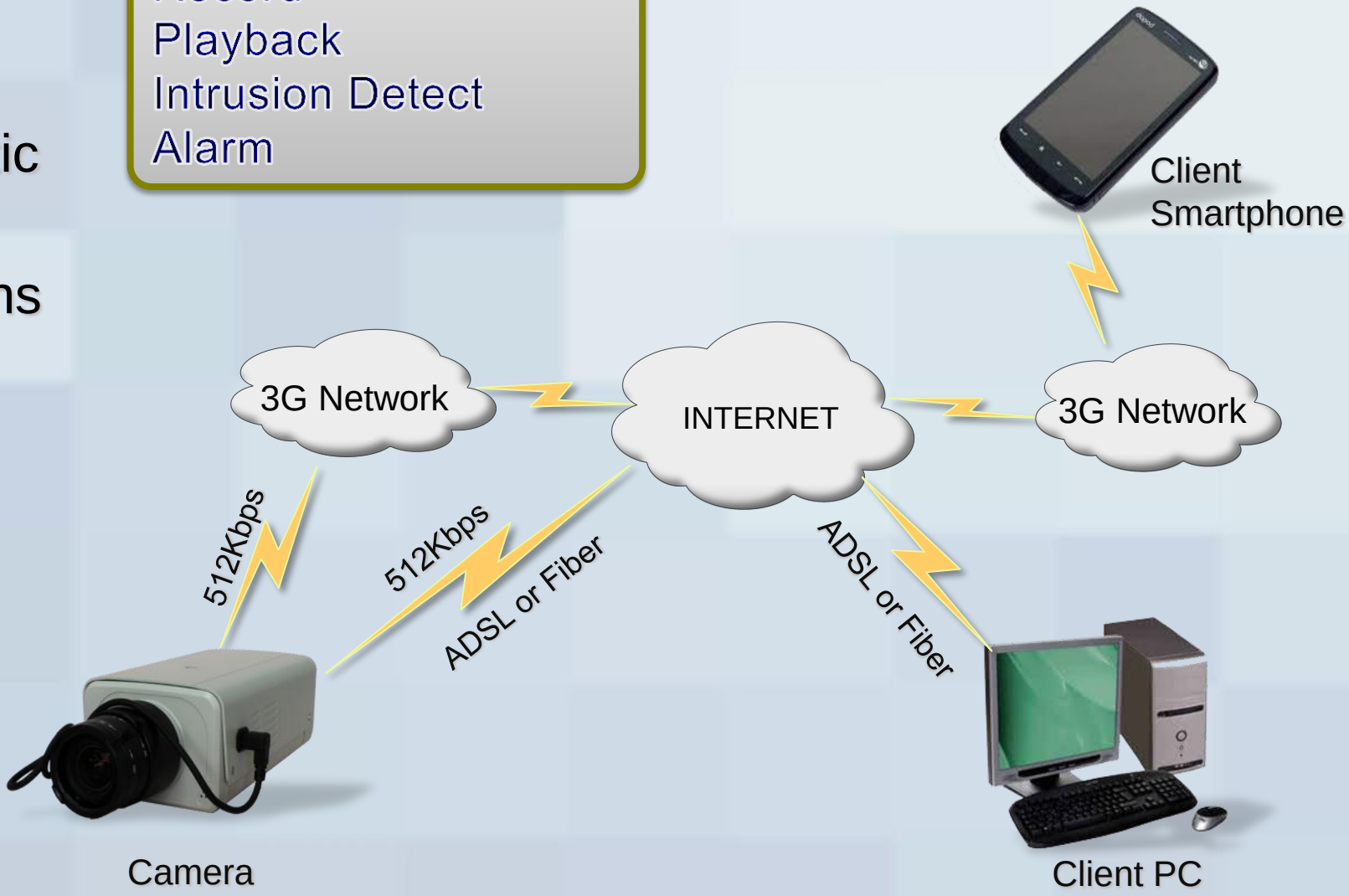

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Typical application
Live stream
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Intrusion Detect
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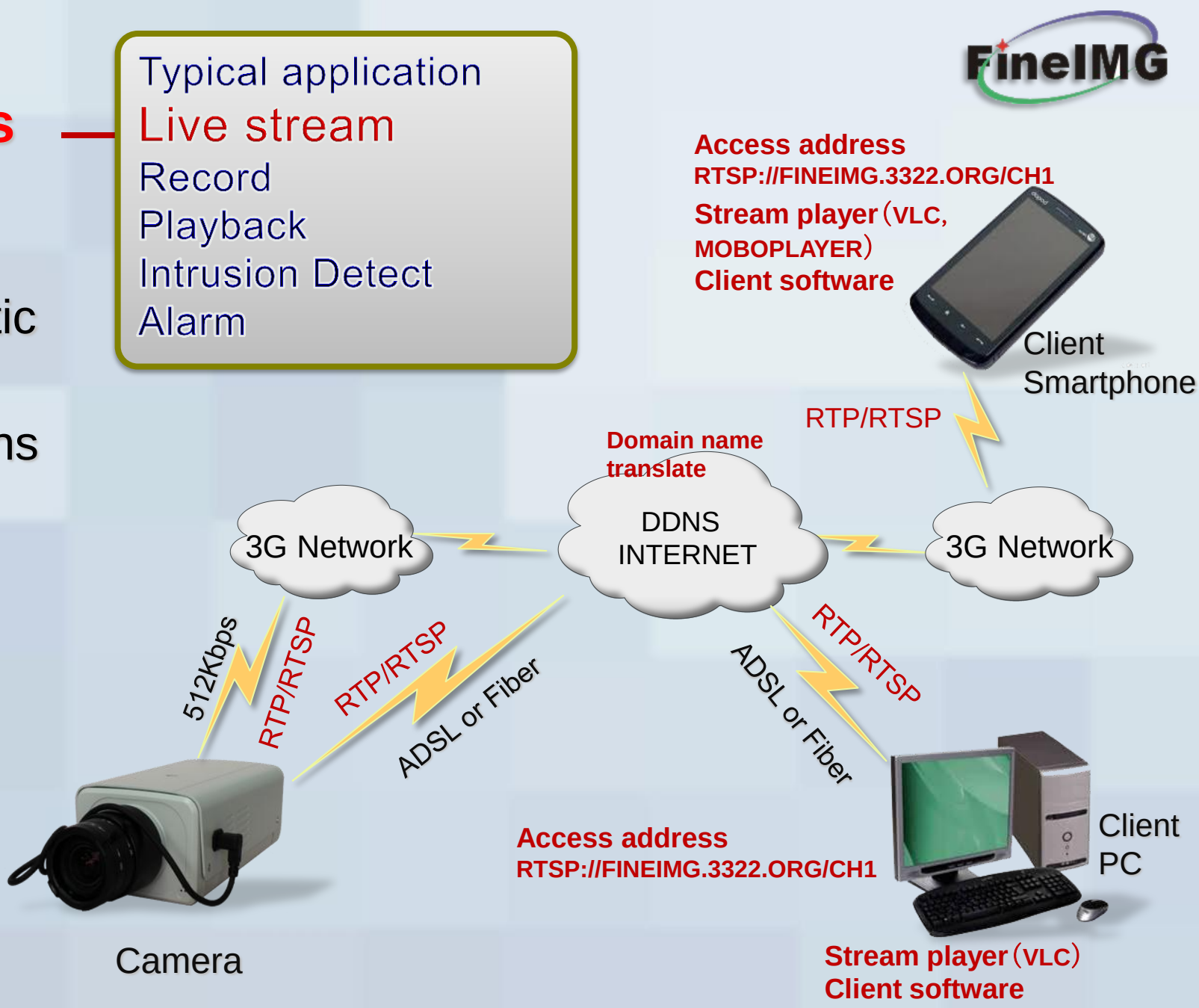

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Typical application
Live stream
Record
Playback
Intrusion Detect
Alarm

Client
Mailbox
SD Card

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Client software
Recording in phone

RTP/RTSP

Domain name translate
DDNS
INTERNET

3G Network

3G Network

512Kbps

RTP/RTSP

RTP/RTSP

ADSL or Fiber

RTP/RTSP

ADSL or Fiber

Camera

Client software
Recording in PC

- Background
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Typical application
Live stream
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Intrusion Detect
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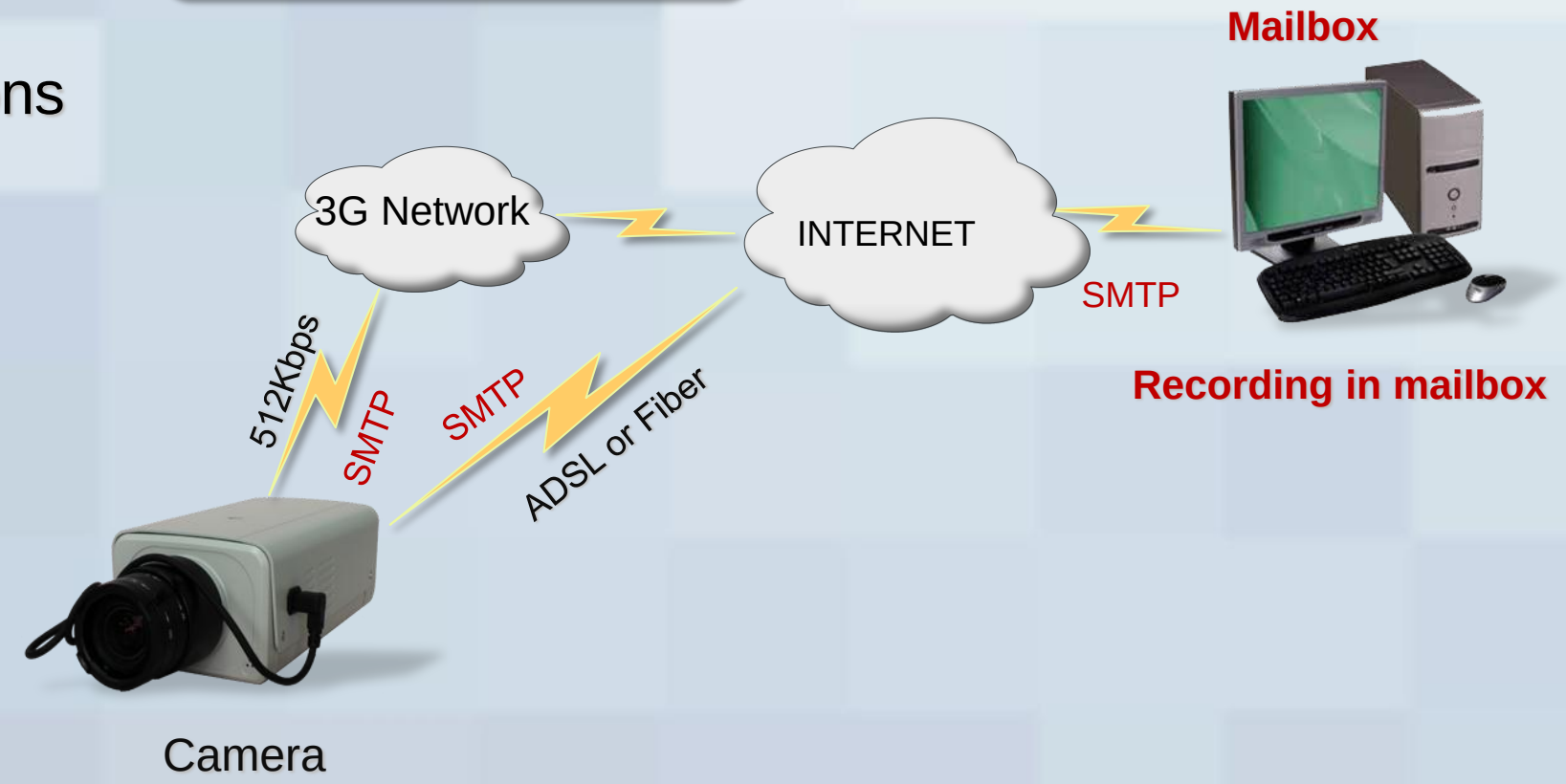
Client
Mailbox
SD Card



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Typical application
Live stream
Record
Playback
Intrusion Detect
Alarm

Client
Mailbox
SD Card

Recording in SD

Camera

- Background
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Typical application
Live stream
Record
Playback
Intrusion Detect
Alarm

- Client
  Client software or MKV player
- Mailbox
  MKV **player**
- SD card
  Client software

- Background
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Typical application
Live stream
Record
Playback
Intrusion Detect
Alarm

Infrared detector

Smoke detector

Gas detector

Magnetism detector

+

Analytics

- Background
- **Functions**
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Typical application
Live stream
Record
Playback
Intrusion Detect
Alarm

1.Send the message to Client software.
2. Client software browse and recording.

Client software
Browse
Recording in phone

RTP/RTSP

Domain name translate

DDNS
INTERNET

3G Network

3G Network

512Kbps

RTP/RTSP

RTP/RTSP

ADSL or Fiber

RTP/RTSP

ADSL or Fiber

Camera

Client software
Browse
Recording in PC

- Background
- Functions
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Camera
FPGA

- Background
- Functions
- **Architecture**
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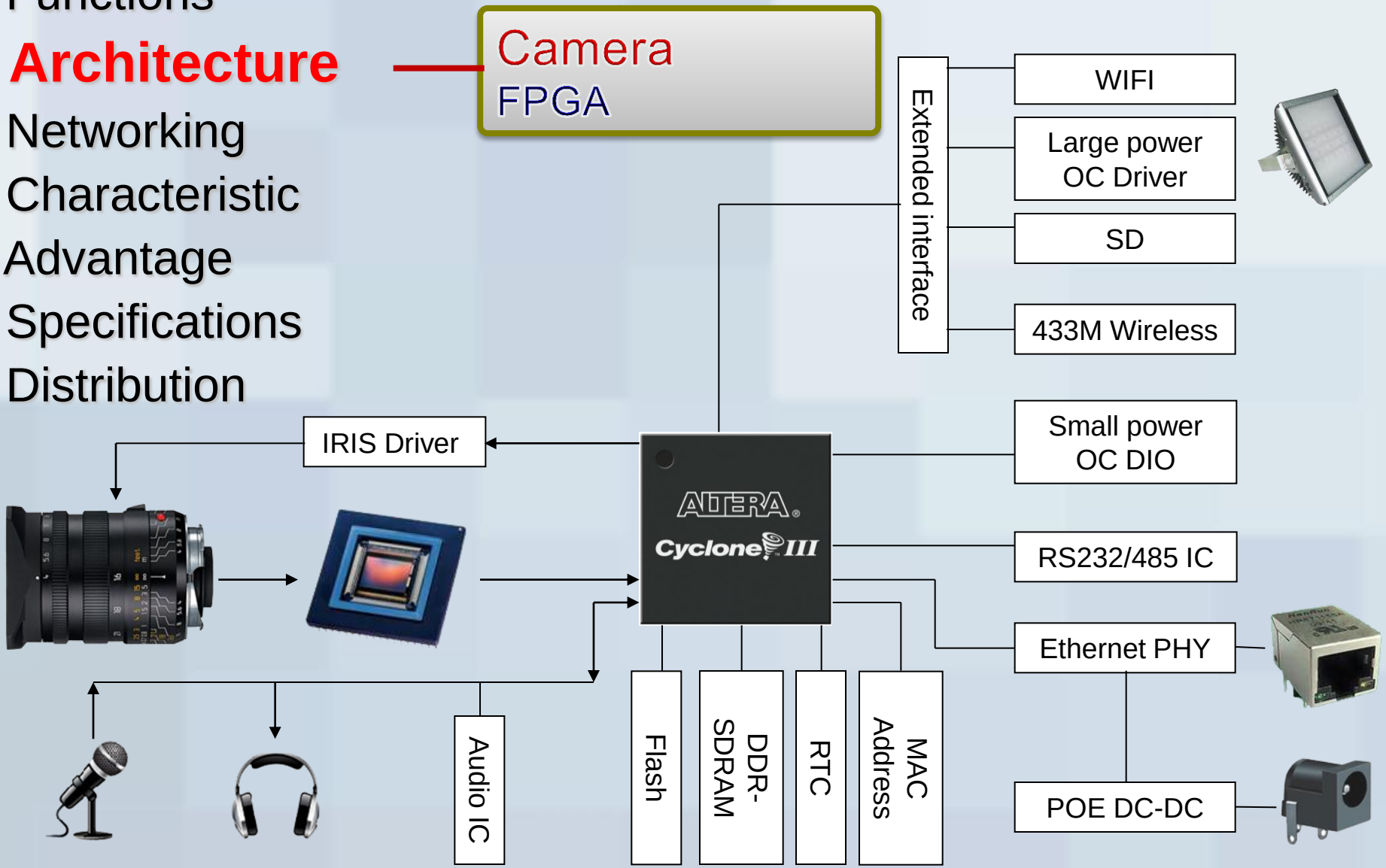

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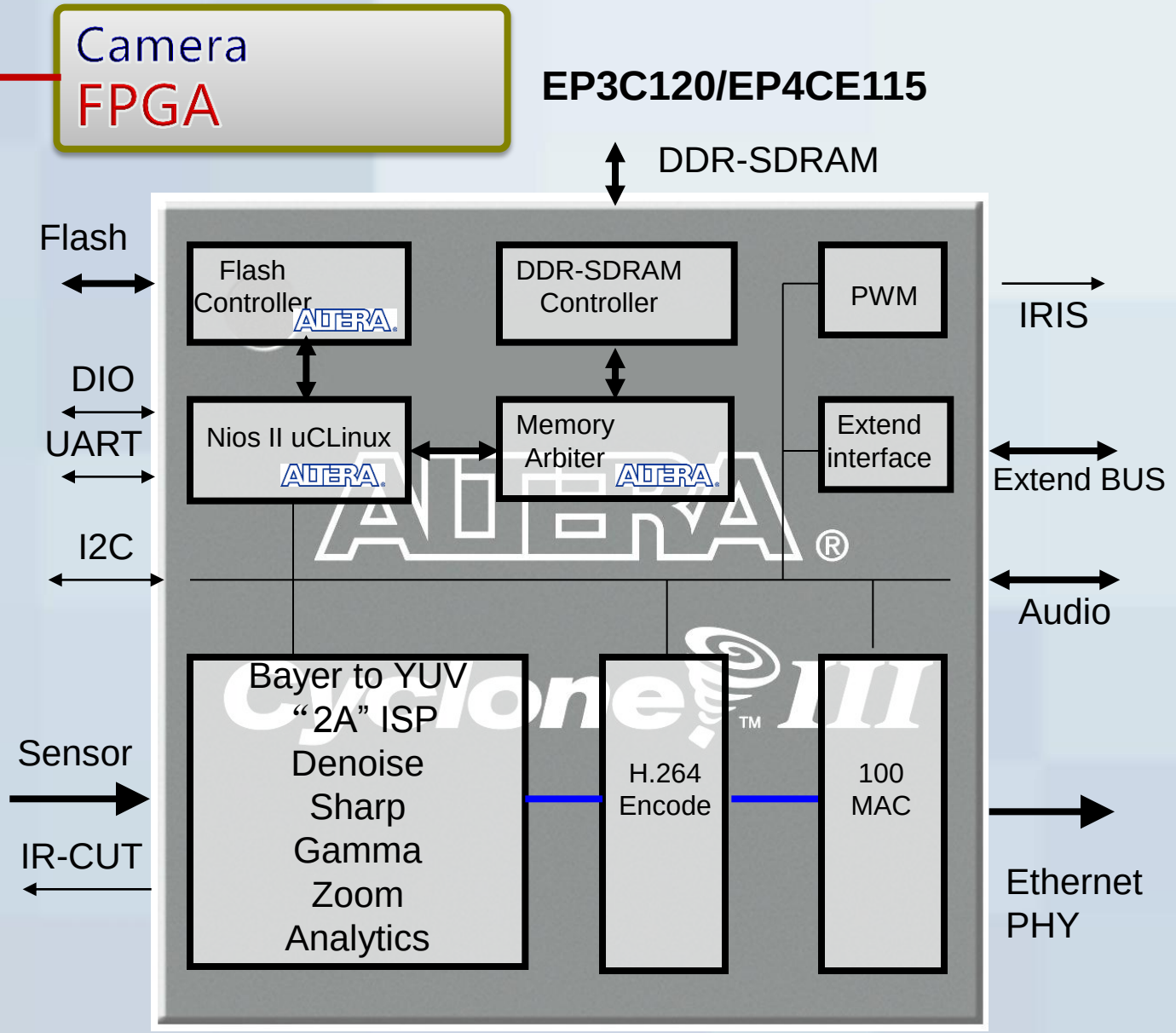

- Background
- Functions
- Architecture
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1 Camera + 1 Client

1 Camera + N Clients

N Cameras + 1 Client

N Cameras + N Clients

- Background
- Functions
- Architecture
- **Networking**
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Application: home, store, factory, office etc.

1 Camera + 1 Client
1 Camera + N Clients
N Cameras + 1 Client
N Cameras + N Clients

Access address
RTSP://FINEIMG.3322.ORG/CH1
Stream player（**VLC, MOBOPLAYER**）
Client software

Client
Smartphone

RTP/RTSP

Domain name translate

DDNS
INTERNET

3G Network

3G Network

512Kbps

RTP/RTSP

RTP/RTSP

ADSL or Fiber

Camera

- Background
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- **Networking**
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1 Camera + 1 Client
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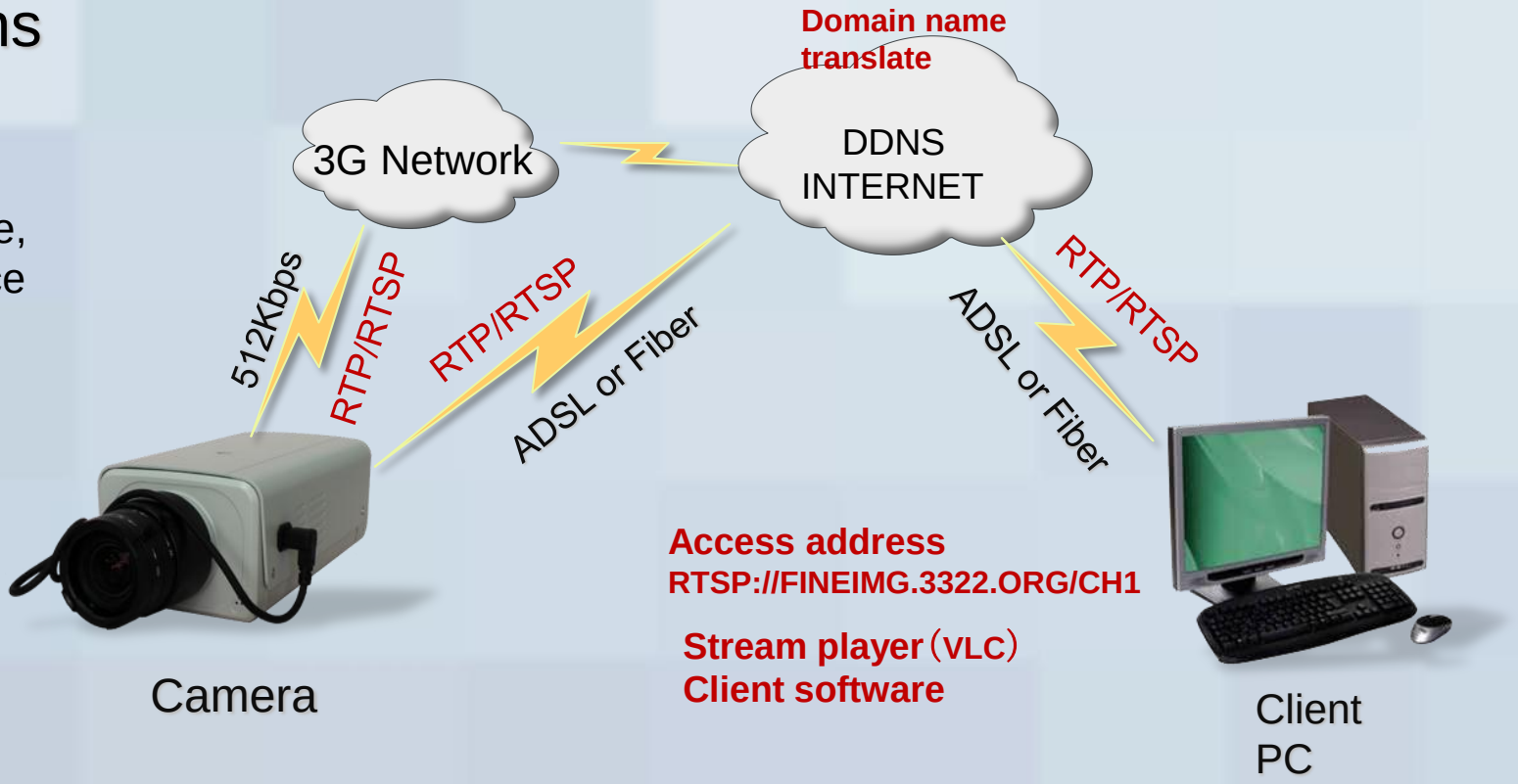
Application: home, store, factory, office etc.



- Background
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- **Networking**
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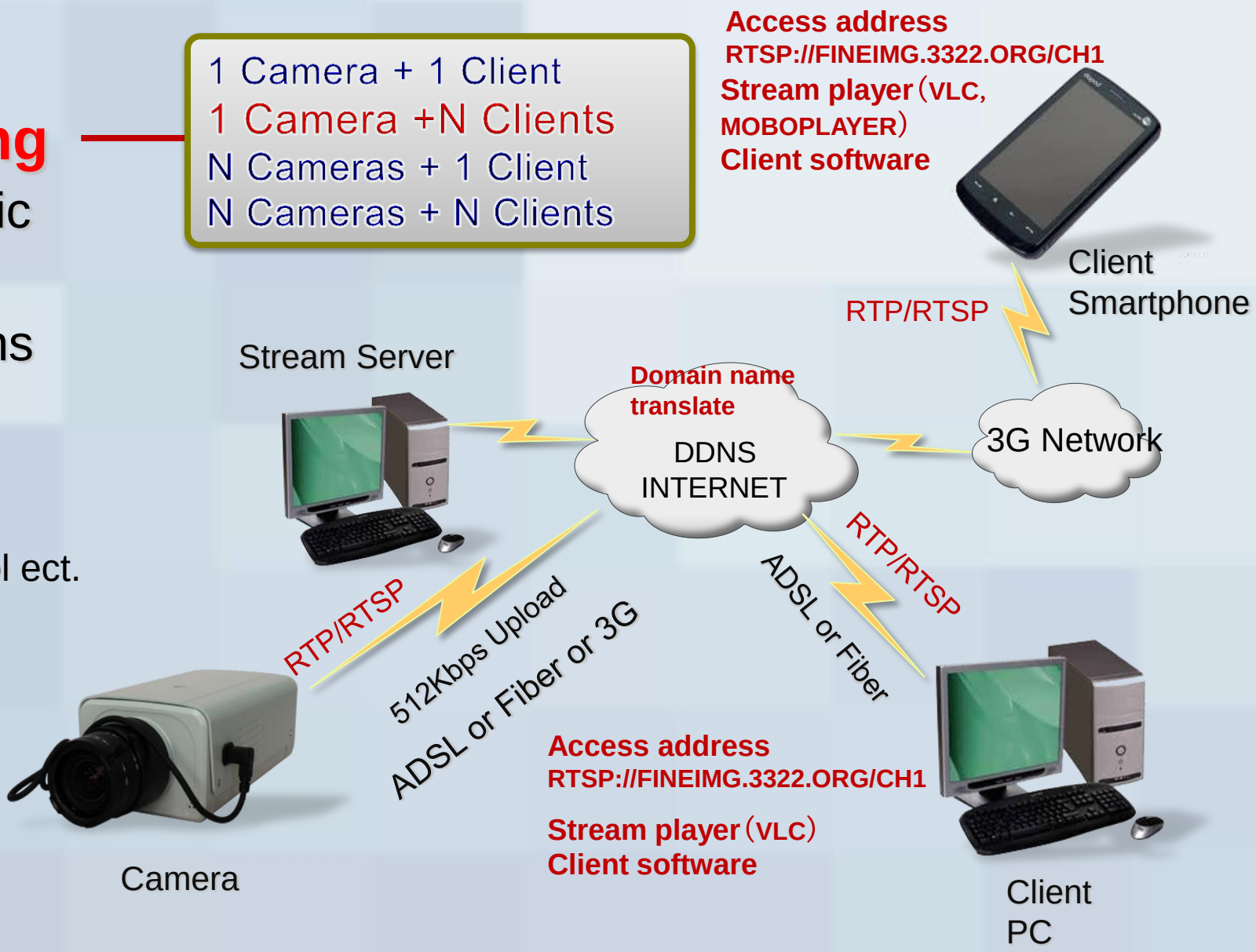
Application:
crossroad, school ect.

1 Camera + 1 Client
1 Camera +N Clients
N Cameras + 1 Client
N Cameras + N Clients



- Background
- Functions
- Architecture
- **Networking**
- Characteristic
- Advantage
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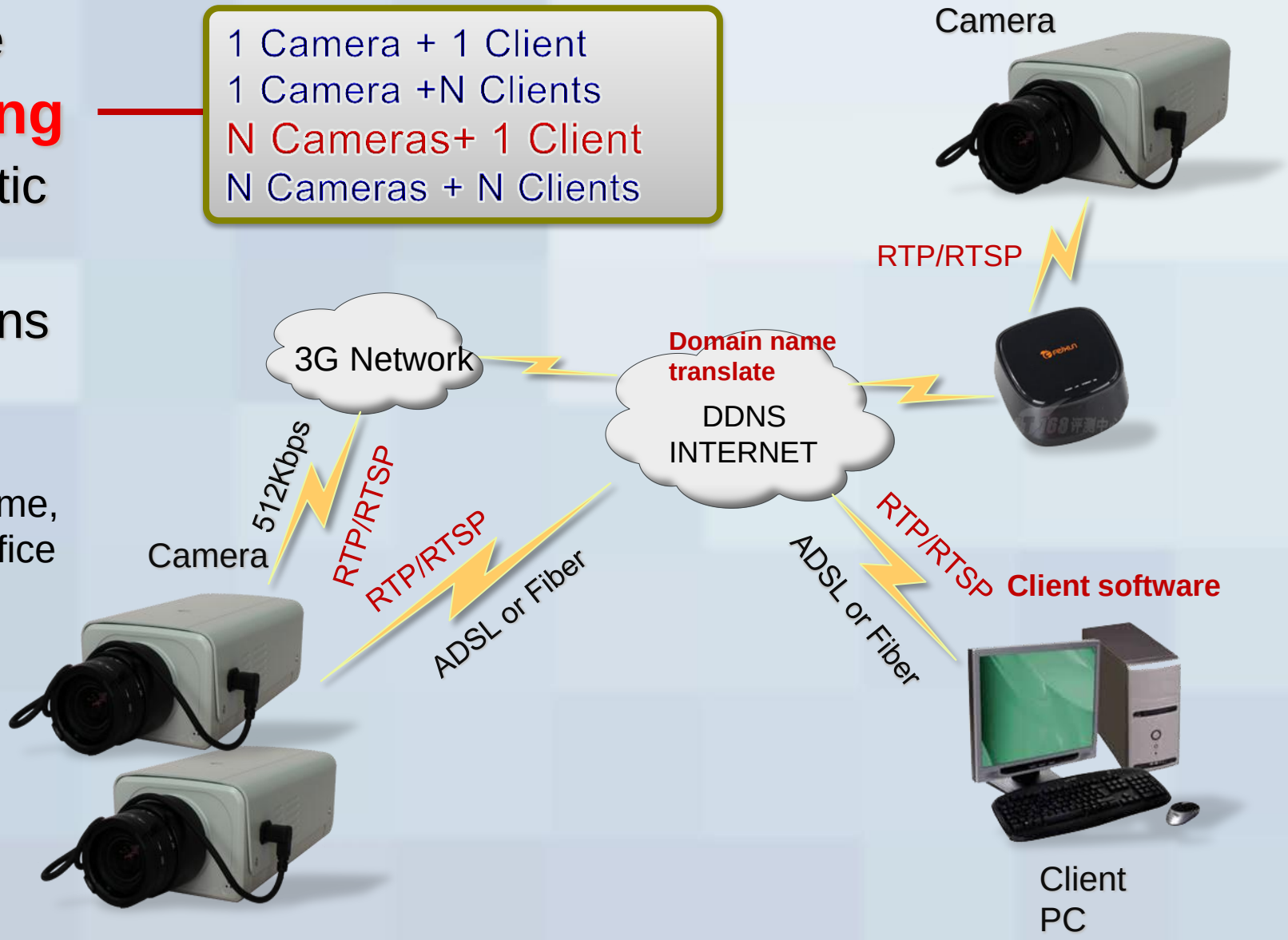
Application: home, store, factory, office ect.

1 Camera + 1 Client
1 Camera +N Clients
N Cameras+ 1 Client
N Cameras + N Clients



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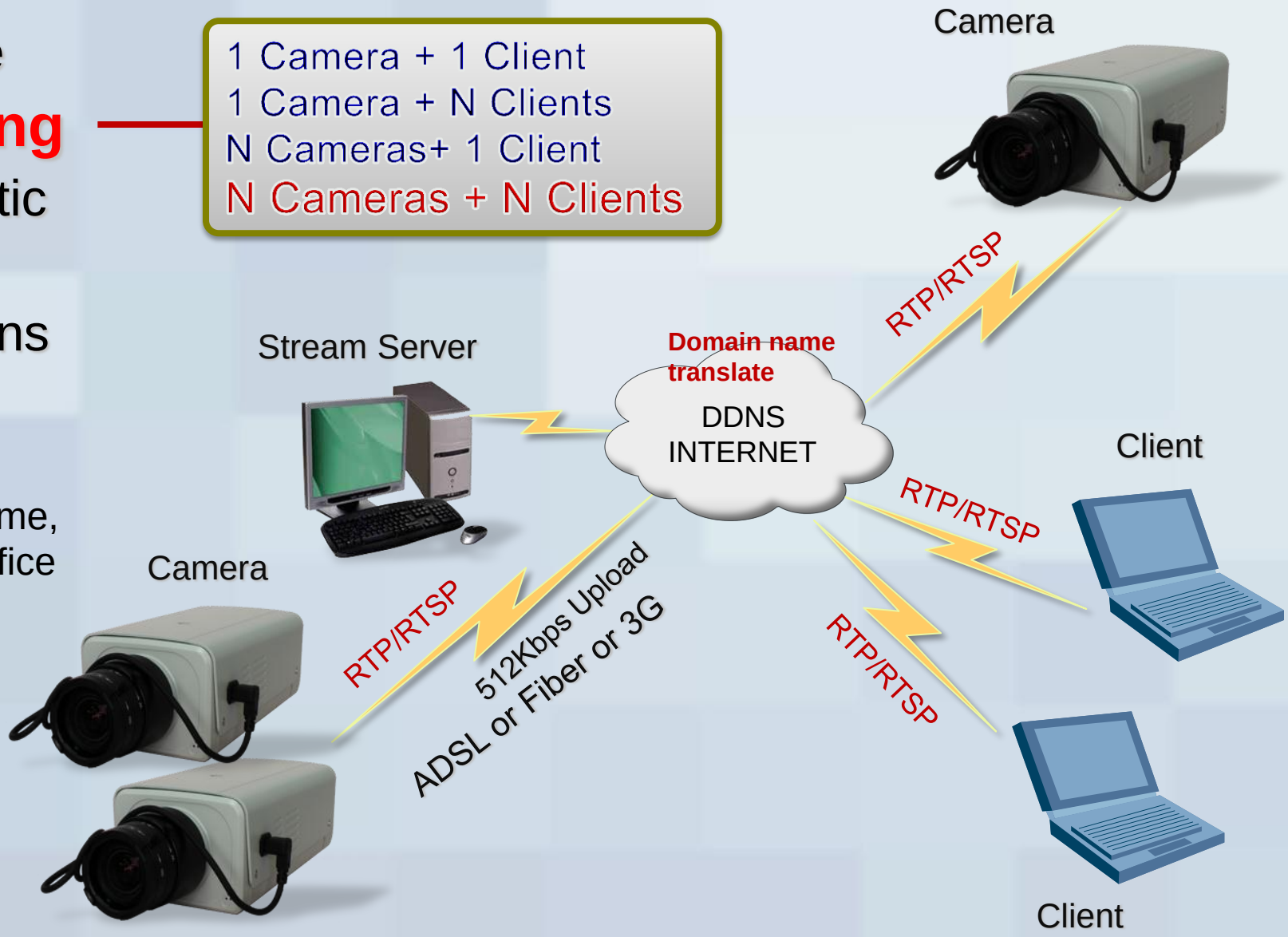
1 Camera + 1 Client
1 Camera + N Clients
N Cameras+ 1 Client
N Cameras + N Clients

Application: home, store, factory, office ect.



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- **Characteristic**
- Advantage
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- Ultra low bit rate
- Smart adaptive
- Single FPGA chip
- Interface to other Home Security device

- Background
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- Ultra low bit rate
- Smart adaptive
- Single FPGA chip
- Interface to other Home Security device

1. To confirm image need encoding by analytics.
2. To precisely predict motion.
3. To confirm suitable video quality according to bit rate.

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- Ultra low bit rate
- Smart adaptive
- Single FPGA chip
- Interface to other Home Security device

1. Parameters affecting bit rate include QP, frame rate, resolution, analytics sensitivity, filter intensity etc.
2. Real time statistics and analysis of stream.
3. Get right bit rate by auto-adjusting the parameters.

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- Ultra low bit rate
- Smart adaptive
- Single FPGA chip
- Interface to other Home Security device

1. SOC in single FPGA.
2. Compactness combine of ISP, Image analytics, H.264 encoding, NIOS
3. NIOSII and uClinux inside.
4. Remote upgrade.

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- Ultra low bit rate
- Smart adaptive
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- Interface to other Home Security device

1. Interface to infrared detector, smoke detector, gas detector etc.
2. Mainframe with video.

- Background
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- **Advantage**
- Specifications
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- Compared with ASIC, using FPGA as SOC has advantage such as powerful, flexible and upgradeable except for higher price. FPGA is not the best choice when used in many common fields such as local network security system, car camera recorder etc.
- ASIC is inapplicable in Internet security system for lack of design flexibility, so very few cameras that support low bit rate HD video are in the sale. This design can solve the problem by using FPGA for it's powerful and design flexibility.
- More logic resources are provided with the development of the FPGA (LE of CYCLONE5 exceed 300k.), so we can implement more advanced and complex algorithms, to get more lower bit rate stream.

- Background
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- **Specifications**
- Distribution

1. Video
2. Audio
3. Image Process
4. Network
5. interface
6. expansion
7. Client software
8. WEB

- Background
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1. Video
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4. Network
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6. extend
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8. WEB

Sensor: APTINA AR0331, 1/3”CMOS, 2.2um Pixel, 39db S/N, 100db WDR
Video1: 1920x1088x11fps, 1440x1088x15fps, 1280x720x25fps, 1136x640x25fps, 1024x768x25fps, 960x544x25fps, 800x480x25fps, 704x576x25fps, 640x480x25fps, 512x384x25fps, 480x320x25fps, 400x240x25fps, 352x288x25fps, 320x240x25fps, Frame rate can decrease to 2.
Video2: Resolution is same as video1 or quarter, frame rate is same as video1 or less.
Video3: Resolution is quarter or sixteenth of video1, frame rate is same as video1 or less.
Encode: H.264 Main Profile 3.1 CABAC.
Multi-Stream: two stream can be accessed at the same time.
Zoom and PTZ: 1X~8X, electron PTZ.

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1. Video
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1. Built-in MIC.
2. Phone output.
3. Two way.
4. 16Kbps/32Kbps G.726.
5. 64 Kbps G.711.
6. Audio detection.

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- Bayer demosaic
- Filter
- Sharpen
- Gamma correct
- AWB
- AE control
- OSD

- Image Analysis
- background modeling
- Multi regions such as private, motion detect, or alarm

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1. Video
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1. 100M full-duplex Ethernet.
2. Protocol: TCP, RTP, RTSP, DHCP, NTP, HTTP, FTP, SMTP, DDNS.
3. Support RTP over UDP or RTP over RTSP.
4. Average bit rate: 16~8128kbps.

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1. RJ45 (POE) socket.
2. DC12~48V socket.
3. 3.5mm headphone jack.
4. IRIS socket.
5. RS232/RS485 terminal.
6. One channel OC driver (250V, 0.2A).
7. One channel OC input.

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1. Video
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8. WEB

1. WIFI
2. SD socket
3. Large power OC driver (250V, 3A)
4. 433M wireless

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1. Multi-Windows.
2. Recording.
3. Playback.
4. Talk to camera.
5. Upgrade.
6. Regions define.

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1. Video
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1. Parameter setting.
2. Upgrade.
3. Alarm info interface.

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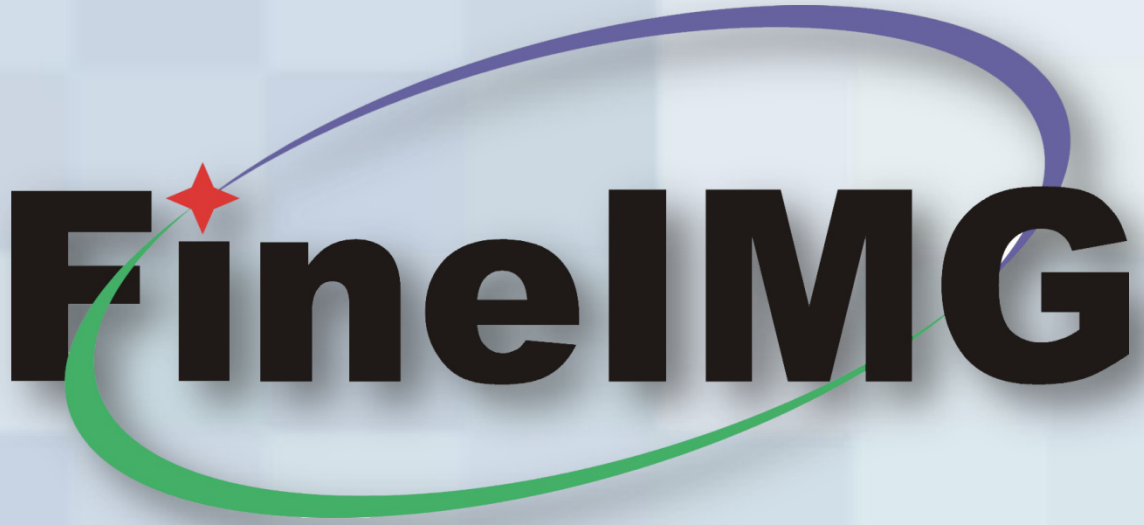
- **Distribution**

- License to manufacturers
- Model to manufacturers or integrators
- Camera to integrators or end users
- Collaborate with other partners that can provide their video intelligent analysis or image process technology



THANKS