Design and Realization of Wireless Video Monitoring System

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Overview

- CDMA technology
- Embedded Linux
- H.264 Digital Video Compression
- Wireless Transmission
- Video Surviellance

Introduction

The video monitoring system needs tge following tecnologies

- Digital Signal Processing
- Video compression encoding and decoding
- Video transmission
- Video storage
- Networking

History of video monitoring systems

The main drawback of most of the previous video monitoring systems :

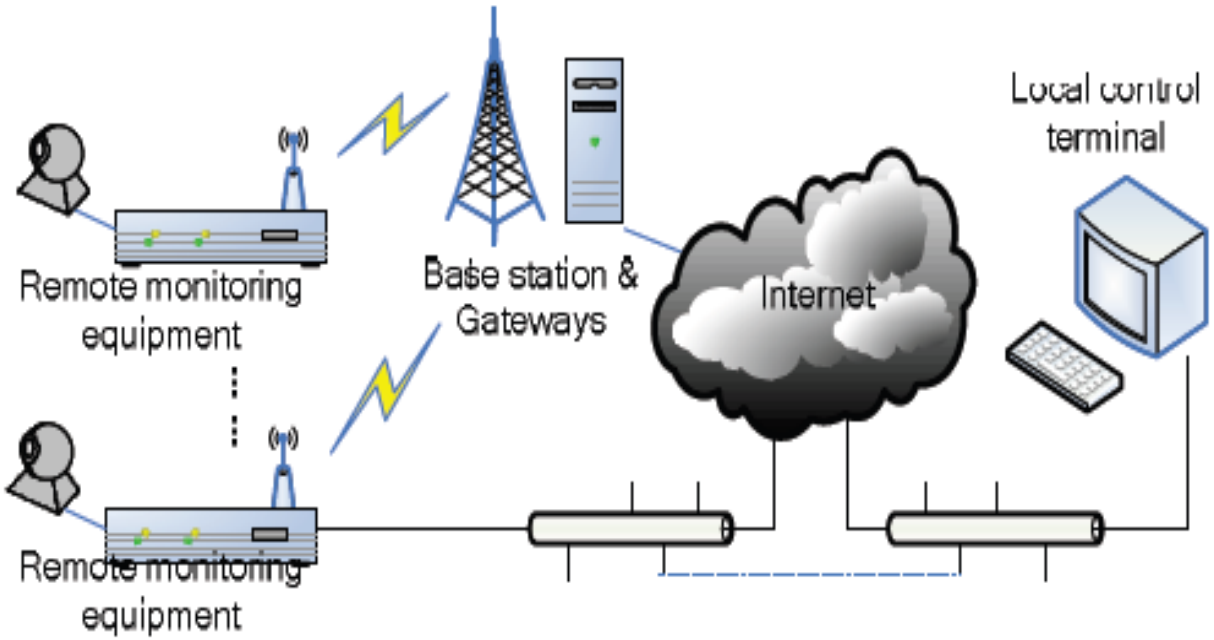
- No Mobiliity

The simple solution for the above problem is designing a Wireless Video Monitoring System.

Wireless Video Monitoring System

Advantage of Wireless monitoring system :

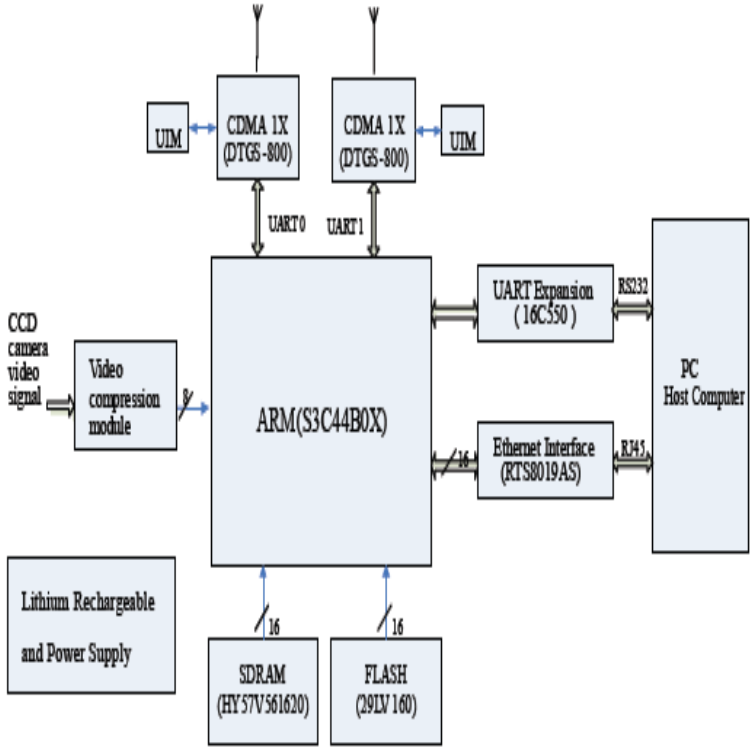
- Long Distances
- Low maintenance cost
- Compatibility of transmission
- More efficiency



Design of Remote Monitoring Equipment

Hardware used in the design

- Video Compressed Module – JM718M
- ARM7 processor – S3C4BOX
- CDMA communication module – GTS-800
- Ethernet Interface – RTL8013AS
- CCD camera
- Flash RAM (16M bit)
- SDRAM (256M bit)



H.264 Video Compression Module

- Video compression module -- JM718M converts the video from the CCD camera in to H.264 signals.
- H.264 signals are processed by the ARM processor
- Processed data is sent to a CDMA module through a serial interface.
- Data is modulated and transmitted by the CDMA module.

ARM processor

- S3C44B0X ARM processor manufactured by Korea SAMSUNG company
- TCP/IP protocol
- HTTP protocol

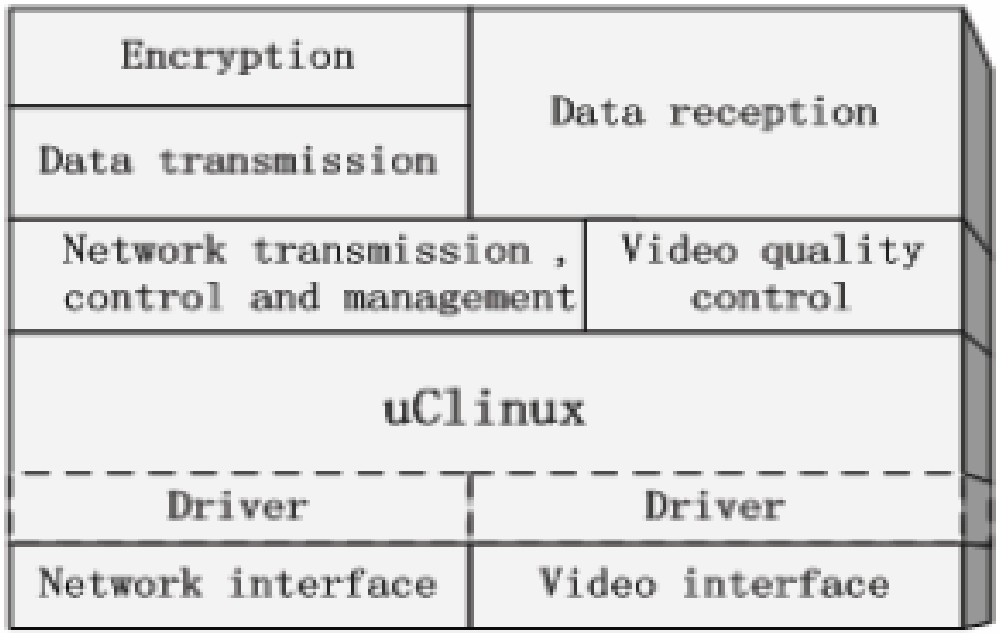
CDMA module

- Two DTGS-800 as CDMA1X modules
- RS-232 interface
- Two modules for better transmission rate
- Multi-channel scheduling strategy for wireless channel transmission

Software Design

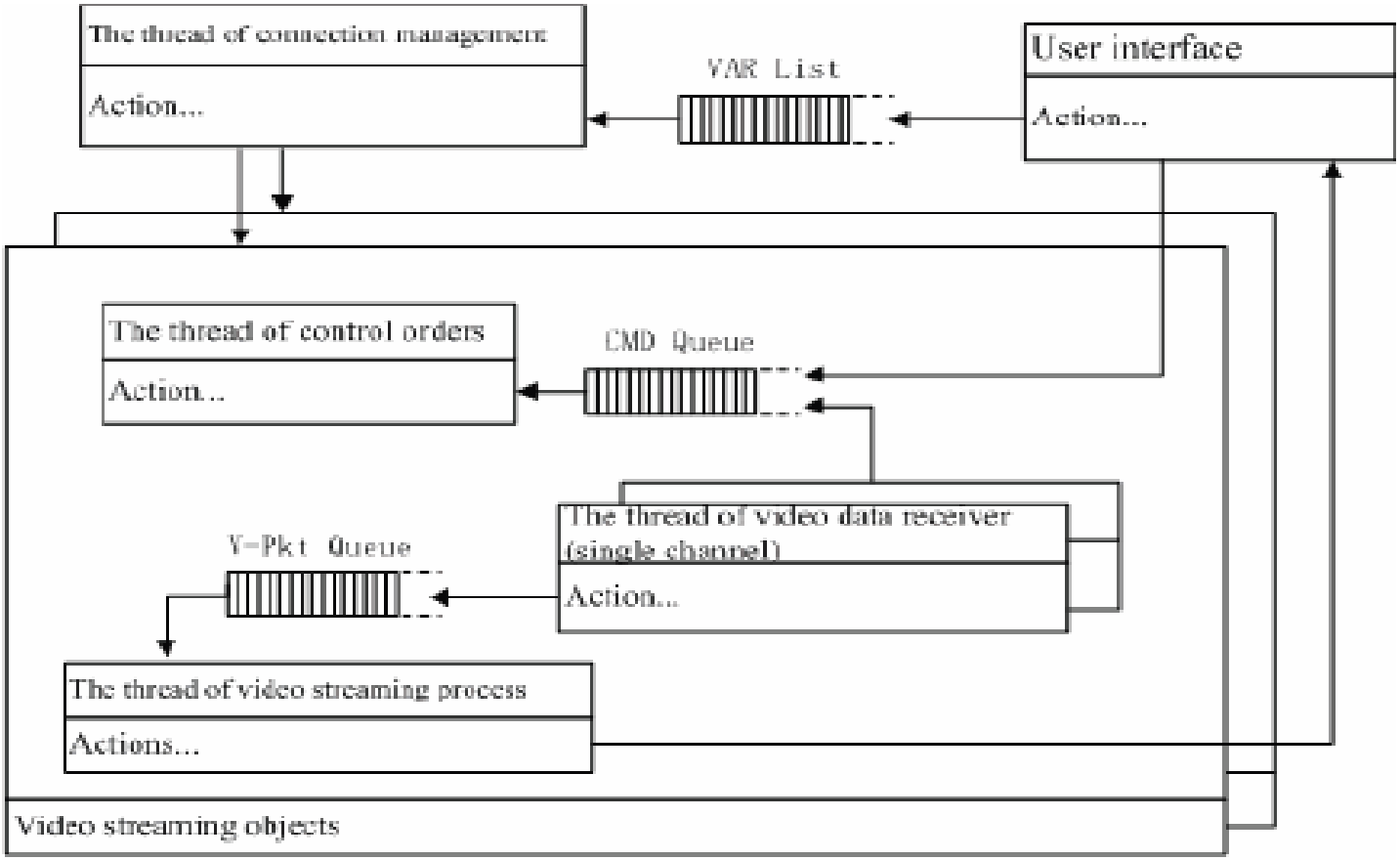
The software architecture consists of three layers

- The Application Layer
- The Operating System Layer
- The Hardware abstract Layer



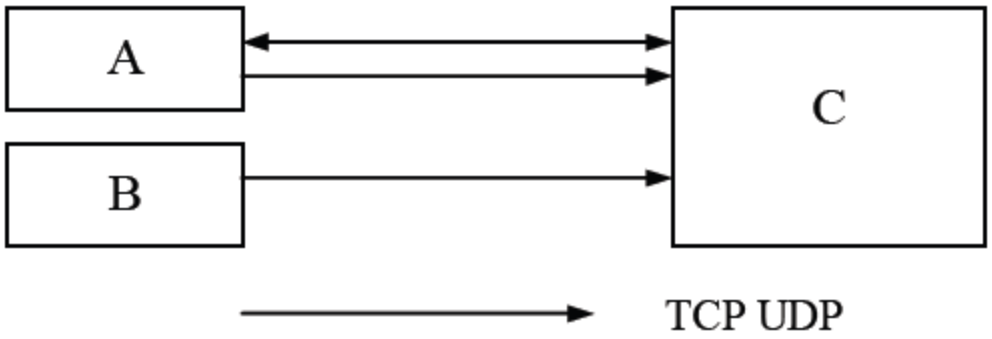
Design of Local control terminal

- Real-time Transport Protocol
- Multi-Threading Model



Communication between remote equipment and local terminal

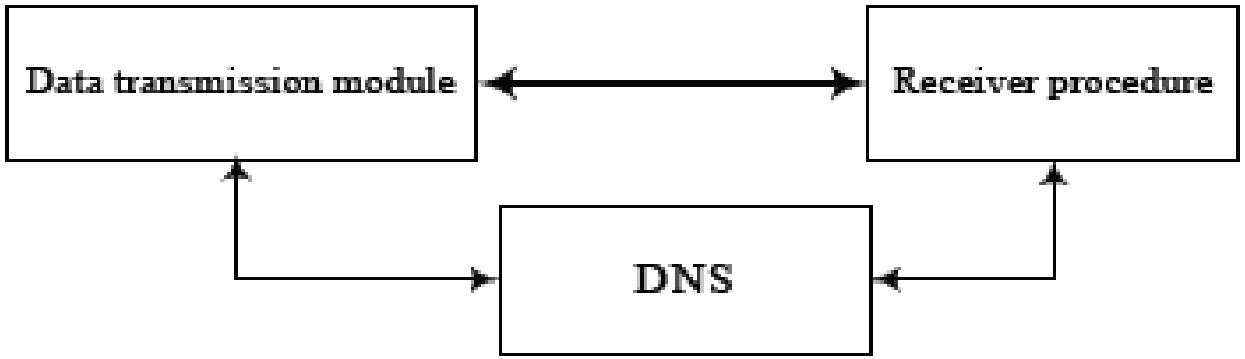
- Static Internet IP address in the local terminal



- Dynamic Internet IP address in local terminal
  - IP address resolution by DNS server
  - Short message to tell the Dynamic IP address

Dynamic IP address

Address resolution Method :



Multilink scheduling poll mechanism

Advantages of Multilink parallel transmission method :

- Improve the actual output
- Avoidance of congestion
- Increase in bandwidth
- Increase in sending rate

Design of Multilink scheduling

- 50% - 80 % of channel actual sending rate
- Reduce probability of congestion

Simulation Experiments

Test time	Last time	Receive frame rate(f/s)	Transmit rate (Kbps)	Packet lost rate of link 0	Packet lost rate of link 1
2007-4-12 10:00	30 min	5.3~8.1	60~80	2.16%	2.01%
2007-4-17 10:00	62 min	4.7~7.8	58~80	2.57%	2.11%
2007-4-18 10:00	35 min	4.9~7.8	60~80	2.13%	2.25%

The transmission rate of double links fixed at 58Kbps to 80Kbps, receiving frame rate from 4.7 f/s to 8.1 f/s.