IP Camera Network	

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IP Camera Network Analysis and Estimate

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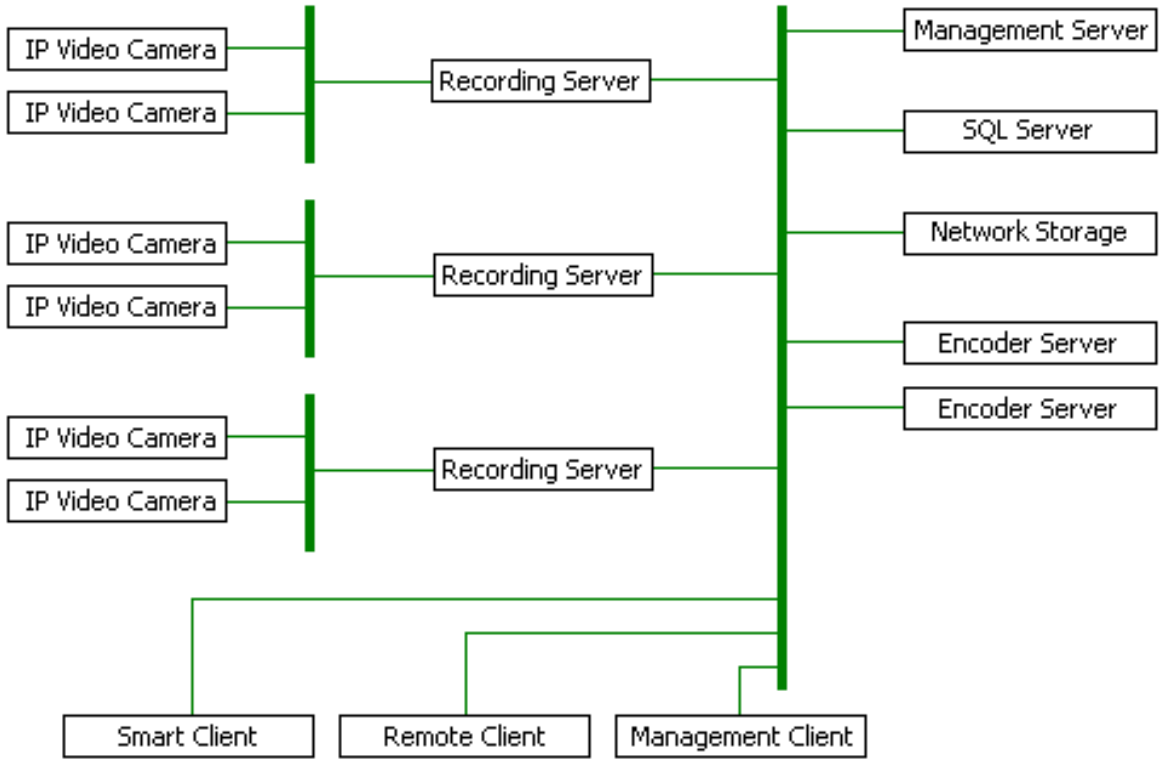
Overview



IP Video Camera – device to get media content. Full-function IP camera or analogue video camera+video server.
Recording Server(s) – hardware video recorder or server with the installed software that records and plays back media content as well as video cameras management. Media content is recorded to the local disk, if necessary it is archived to the network storage. It's located in a single subnetwork with video cameras to efficiently use the channel bandwidth.
Management Server – server to manage the Recording servers, Encoder servers, video cameras and user permissions.
SQL Server – server of a single DB that stores settings of the Recording servers, Encoder servers, video cameras and user permissions
Network Storage – network storage for long-term archiving with the access via one of the standard protocols (FTP)
Encoder Server(s) – server with the installed software that converts media stream to different formats, supported by the clients, and performs stream publishing in the network.
Smart Client – application that provides a full access to the media network capabilities. It can work using both the stream, received from the Encoder server after the format converting, and stream in the original camera format. Running on the same subnetwork with the Recording server, it can play back multicast video.

Remote Client – web-application that provides remote access to all the main capabilities of the media network. Stream of the video, received from the Encoder server, it's played back by the Flash player. Both full and scaled-down (mobile) versions of the site are implemented.
Management Client – web-application that provides full access to the Management server.

Server Modules

1. Recording Server
1.1. Simultaneous digital multi-channel MJPEG, MPEG4 and H.264 video recording
1.2. Multiple recording modes
1.3. Control of PTZ operation from clients with user priority
1.4. Ability to combine cameras in groups for easy management
1.5. Multiple playback modes
1.5.1. Go to recording by date and time
1.5.2. Go to recording by event
1.6. Streaming
1.6.1. Single stream
1.6.2. Multiple streams with different parameters
1.6.3. Sequential video stream switching
1.7. Archive search
1.7.1. By date and time
1.7.2. By event type
1.7.3. By camera ID
1.8. Digital zoom
1.9. Communication with Network Storage
1.10. Alarms and events handling
1.10.1. Interaction with alarm signal sources
1.11. Simultaneous work with multiple network clients
1.12. Multicast one video stream to all Smart Clients
1.13. Notifications
1.14. Ability to download archived records from the cameras
1.15. Authentication
1.15.1. User registration
1.15.2. Management of user rights and privileges
1.16. Encryption & password protection option for archived recordings and files
1.17. Logging
1.18. Hot-swappable drives

2. Encoder Server
2.1. Video stream listening
2.2. MPEG-4 -> FLV converting
2.3. Video stream publishing

3. Management Server
3.1. Communication with Recording server(s)

3.2. Communication with Encoder server(s)
3.3. Communication with DB server
3.4. Communication with Network Storage
3.5. Simultaneous work with multiple network clients
3.6. Authentication
3.6.1. User registration
3.6.2. Management of user rights and privileges
3.7. Encryption & password protection option for archived recordings and files
3.8. Logging

4. SQL Server

5. Network Storage

Client Modules

1. Smart Client
1.1. Playback
1.1.1. Live-video playback
1.1.2. Video archives playback
1.1.3. Image archives playback
1.2. Video navigation controls
1.3. Image processing
1.3.1. Digital zoom
1.4. Video and image search by date and time
1.5. PTZ control
1.5.1. PTZ preset positions
1.5.2. PTZ point-and-click control
1.5.3. PTZ zoom to a defined rectangle
1.6. User interface
1.6.1. Different view layouts
1.6.2. Preview
1.6.3. Fullscreen
1.7. Use of the media streams compressed on the server side
1.8. Multicast support
1.9. Export
1.9.1. Create video files or save JPEG images
1.9.2. Sending video and images by e-mail, MMS
1.9.3. Export to Microsoft Office
1.9.4. Print
1.10. Authentication

2. Remote Client
2.1. Playback
2.1.1. Live-video playback.

2.1.2. Video archives playback
2.1.3. Image archives playback
2.2. Video navigation controls
2.3. Image processing
2.3.1. Digital zoom
2.4. Video and image search by date and time
2.5. PTZ control
2.5.1. PTZ preset positions
2.5.2. PTZ point-and-click control
2.5.3. PTZ zoom to a defined rectangle
2.6. User interface
2.6.1. Different view layouts
2.6.2. Preview
2.6.3. Fullscreen
2.7. Use of the media streams compressed on the server side
2.8. Export
2.8.1. Create video files or save JPEG images
2.8.2. Sending video and images by e-mail, MMS
2.8.3. Export to Microsoft Office
2.8.4. Print
2.9. Authentication

3. Management Client
3.1. Authentication
3.2. Management of Recording/Encoder/SQL/Storage servers
3.3. Management of cameras, grouping and applying new device settings
3.4. Management of virtual camera streams
3.5. Management of alerts and time & notification profiles
3.6. Management of users and groups. Restriction of access to specific cameras and application functionality.
3.7. Access to various logs to check hardware information, user audit information and camera events.

Estimation

№	Task name	Man/days	Notes
1.	**Recording Server**		**Server application**
1.1.	Communication with IP cameras	7	
1.2.	Streaming	7	
1.3.	PTZ control	4	
1.4.	Digital zoom	4	
1.5.	Recording modes	4	
1.6.	Media search	4	
1.7.	Communication with Network Storage	4	

1.8.	Task scheduling	4	
1.9.	Event handling	7	
1.10.	Notification system	4	
1.11.	Authorization/restriction of access logic	7	
1.12.	Administration logic	10	
1.13.	Web-interface	14	
		80	
2.	**Encoder Server**		**Server application**
	Encoder module development	10	
	Red5 additional modules development	20	
		30	
3.	**Management Server**		**Web-service**
3.1	Business objects implementation	7	
3.2.	DAO implementation	5	
3.3.	Web methods implementation		
	Communication with DB	14	
	Communication with Network Storage	9	
	Communication with Encoder server	15	
	Communication with Recording server	12	
		62	
4.	**SQL Server**		**Database development**
	DB structure implementation	9	
	Procedures / functions / triggers implementation	7	
		16	
5.	**Network Storage**		**Network storage development**
		2	
6.	**Management Client**		**Web-application**
	Web pages design	7	
6.1.	Authorization logic/page	2	
6.2.	Application logic/pages		
6.2.1.	Server management logic/page	7	Management of Recording/Encoder/SQL/Storage servers
6.2.2.	Device management logic/page	7	Management of cameras, grouping and applying new device settings
6.2.3.	Media source management logic/page	7	Management of virtual camera streams.
6.2.4.	Events & Alerts management logic/page	7	Management of alerts and time & notification profiles
6.2.5.	Security management logic/page	7	Management of users and groups. Restriction of access to specific cameras

			and application functionality.
6.2.6.	Server logs logic/page	3	Access to various logs to check hardware information, user audit information and camera events.
		47	
7.	**Smart Client**		**Desktop application**
7.1.	Window interface design	7	
7.2.	Authorization logic/window	2	
7.3.	Application logic/windows		
7.3.1.	Live video window		
	Media playback	4	
	Media source selection	2	
	Event list	2	
	PTZ control	4	
7.3.2.	Archive window		
	Media playback	4	
	Media source selection	1	
	Event list	1	
	Media selection by date and time	2	
	Media search	2	
	Export & Print	5	
7.3.3.	Settings window	4	
		40	
8.	**Remote Client**		**Web-application**
8.1.	Flex/flash controls		
8.1.1.	Client info control		
	Brief control form	3	
	Editable control form	4	
	Data access logic	3	
8.1.2.	Presets control		
	Flash control	3	
	Data access logic	1	
8.1.3.	Client project (cameras) list control		
	Flash control	2	
	Data access logic	1	
8.1.4.	Archive player control		
	Date scrollable control	4	
	Playback logic	2	
	Image processing (zoom, pan, selection)	6	
	Images list logic	5	
	Export images logic (print, sending MMS, MS Office, e-mail, save to local)	5	

	Data access logic	5	
	Loading image progress control	2	
8.1.5.	Panorama image control		
	Flash control and navigation logic	3	
	Data access logic	2	
8.1.6.	Live video player control	9	Base functionality: stream and FLV playback
8.1.7.	Navigation control	7	
8.1.8.	Connection data/conditions control	15	Depends of cameras feature
8.1.9.	Calendar control	5	
8.1.10.	Main menu control	7	
8.1.11.	Flex business objects	7	
8.1.12.	Flex transport layer	4	
8.2.	Web site (full version)		
	Web pages design	14	
	Client dashboard	3	
	Live video page	4	
	Archives page	4	
	Settings page	7	
	Help pages/demos	10	
	Authorization logic/web pages	3	
8.3.	Web site (mobile version)		
	Web pages design	2	
	Client dashboard	3	
	Live video page	4	
	Archives page	4	
	Authorization logic/web pages	1	
		164	

The preliminary Total Estimate is: 440 days x 8 hours = 3520 hours

Additional information required to develop the most efficient architecture

1. The total number of the video cameras in the network.
2. The planned network load (the total number and the number of simultaneously connected administrators, smart clients, remote clients).
3. Further plans for the network growth.
4. Necessity of integration to the already existing infrastructure.
5. Ability to use hardware video recorders or necessity of the software solution (server+software) performing the same functions.
6. OS for server components.

7. OS for client modules (application to administer the network, client application to view and manage).
8. Necessity of the centralized management.
9. Necessity of the long-term network storage.
10. Necessity of the single DB use.
11. Necessity of clustering to distribute load over several servers.
12. Necessity of the fairly easy deployment (minimizing the total number of equipment, servers and software).
13. Data loss criticality related to temporary malfunction of the recorder.
14. Necessity of the separate channels use to transmit media stream and video camera control commands.