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DIGITAL PAY-TV SYSTEMS

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Eastern MultiMedia Co. Ltd.

NagraVision Statement Of Work (SOW)

Version 0.4

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Acronyms and Abbreviations

Term	Definition	Description
ATSC	Advanced television systems committee	Standardization group for USA.
CC	Call collector	SAS process collecting calls from the set top box.
c.f.,	*confer*, compare	—
CA *System*	Conditional Access *System*	A generic term for a system used in pay television.
DVB	Digital Video Broadcasting	DVB is a family of international standards for all program delivery media: satellite, cable, terrestrial, microwave, MDS, CATV, and SMATV.
e.g.,	*exempli gratia, for example*	—
ECB	Entitlement Control Broadcaster	Equipment which combines EME, EMB and ECS
ECE	Entitlement Control Encryptor	Equipment that generates a control word, puts it in an ECM, encrypts the ECM and communicates it to the multiplexer.
ECM	Entitlement Control Message	Message used by the channel manager to define the broadcasting parameters of a TV program (channel ID, theme, level...) and the decoding information.
ECS	Entitlement Control encryptor for SimulCrypt	SimulCrypt version of the ECE
EMB	Entitlement Management Message Broadcaster	Equipment that broadcast the EMM
EME	Entitlement Management Encryptor	Equipment that encrypts the EMM.
EMM	Entitlement Management Message	Message sent to one or more receivers. It contains commands and/or data (rights, delta time, ZIP code, etc.), and modifies smart card content.
EPG	Electronic Program Guide	User-activated TV display showing present and following events on every service.
i.e.,	*id est,* that is	—
IMS	Information Management System	DB and set of applications in charge of gathering program and conditional access information
MDI	Multimedia Injector	Equipment which injects the EPG data and the DVB MPEG-2 tables into the multiplexer.
MPEG-2	Moving Pictures Experts Group	MPEG-2 is an evolving ISO/ITU standard for compressing full-motion broadcast-quality video.
NB.	Nota bene	Means ‘Note’.
No.	Number	e.g., No. 27
PBL	Product Builder	Application that allows to create/edit subscriber’s products
SAS	Subscriber authorization System	Set of applications used to manage rights in CAS
SCN	Schedule Navigator	Application that allows to monitor events current access rights and to perform last minute changes
SMS	Subscriber Management System	Application that allows subscriber management for a CAS (addresses, subscriptions, invoicing, pairing, etc.).
STB	Set Top Box	Interface device that allows receiving signal, demodulates it and de-scrambles it
TSS	Traffic & Scheduling	
VOD	Video On Demand	

Table 1 Acronyms and Abbreviations

1. Introduction

This document is created at the beginning of the project and aims at giving, as a result of the interactions between Eastern MultiMedia Co. Ltd., Hitron Technologies and NagraVision.

The relationships are defined as Eastern MultiMedia Co. Ltd. as the CUSTOMER, Hitron Technologies as the MAIN LOCAL SYSTEM INTEGRATOR and NagraVision as the CAS vendor and SYSTEM INTEGRATOR.

The project Statement Of Work (SOW) defines the system requirements, the design of the proposed solution and the scope of NagraVision delivery. This document also describes the roles and responsibilities shared between Eastern MultiMedia Co. Ltd. , Hitron Technologies and NagraVision.

The SOW reflects the status at Purchase Order time. Any further modifications or extensions are subjected to ECO.

1.1 Audience

The Statement of Work document is focused at the Eastern MultiMedia Co. Ltd. Project Manager and Hitron Technologies Project Manger.

1.2 Document history

Version	Author(s)	Date	Description
0.1	Gary Kueh	20th March 2002	First version
0.2	Gary Kueh	27th May 2002	Revised Version
0.3	GKU, PPU	17th June 2002	Revised Version
0.4	GKU, PPU	7th July 2002	Revised Version

1.3 Document distribution

Version	Author(s)	Sent to	Date	Description
0.1	Gary Kueh	Jack Lai	26th March 2002	First version
0.2	Gary Kueh	EMC PM Team	27th May 2002	Revised Version
0.3	GKU, PPU	EMC PM Team	17th June 2002	Revised Version
0.4	GKU, PPU	EMC PM Team	7th July 2002	Revised Version

2. Overall System Architecture

2.1 Head-End overview

Fig. 1 shows the overall conceptual diagram of the CA system.

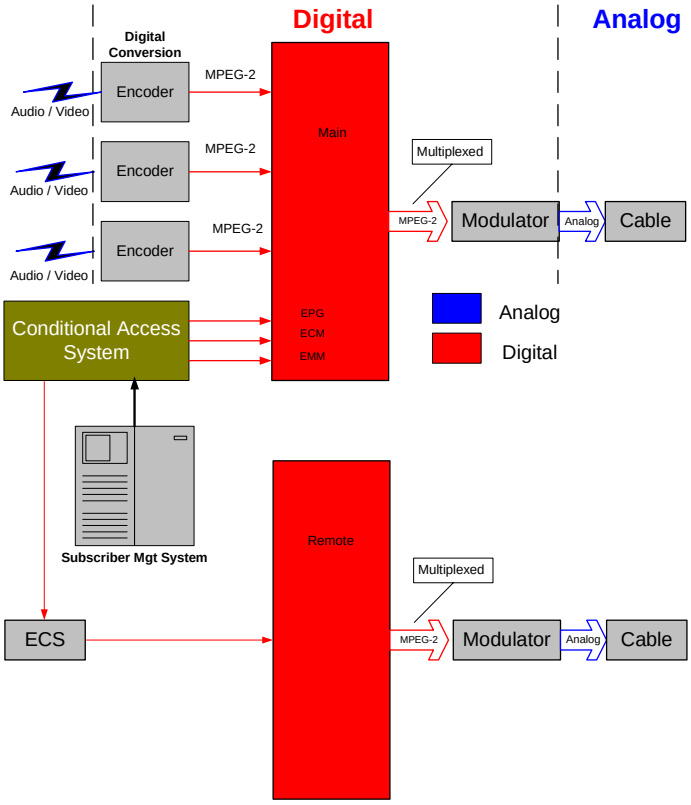

Fig. 1 Conceptual View

2.2 Integrated configuration

Fig 2 shows the configuration of the Eastern MultiMedia Co. Ltd. integrated numeric solution with its main components. The detailed architecture and the interfaces definition are described hereafter in the document. Hitron Technologies is the Main System Integrator, NagraVision provides the CA system. Nextream provides the compression equipment. Cablesoft provides the SMS. The STB is from Visionetics, Nokia.

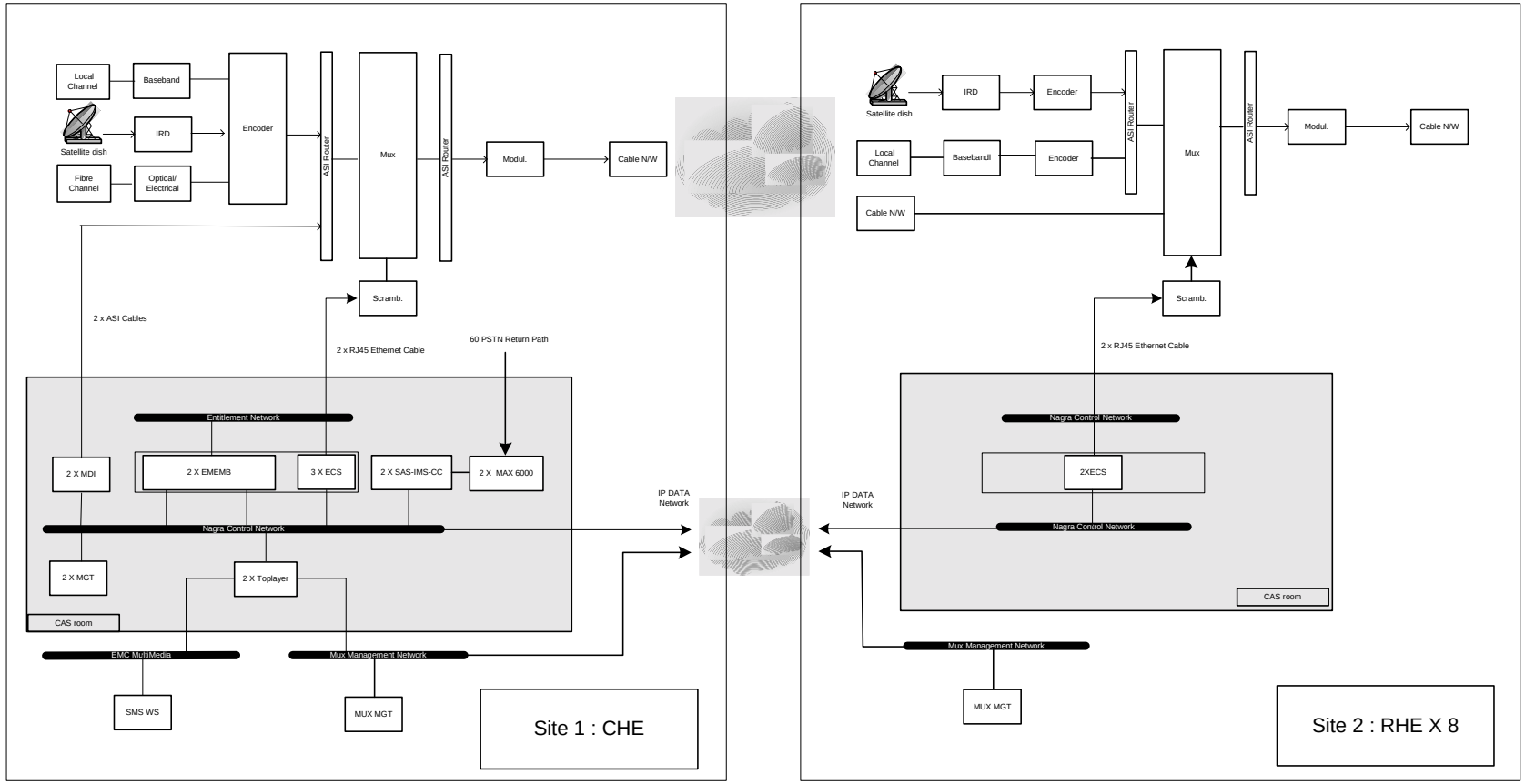

Fig. 2 Integrated configuration

3. NagraVision System Design

3.1 Functional Design

The following diagram details the logical components of the NagraVision solution for **Eastern MultiMedia** Co. Ltd..

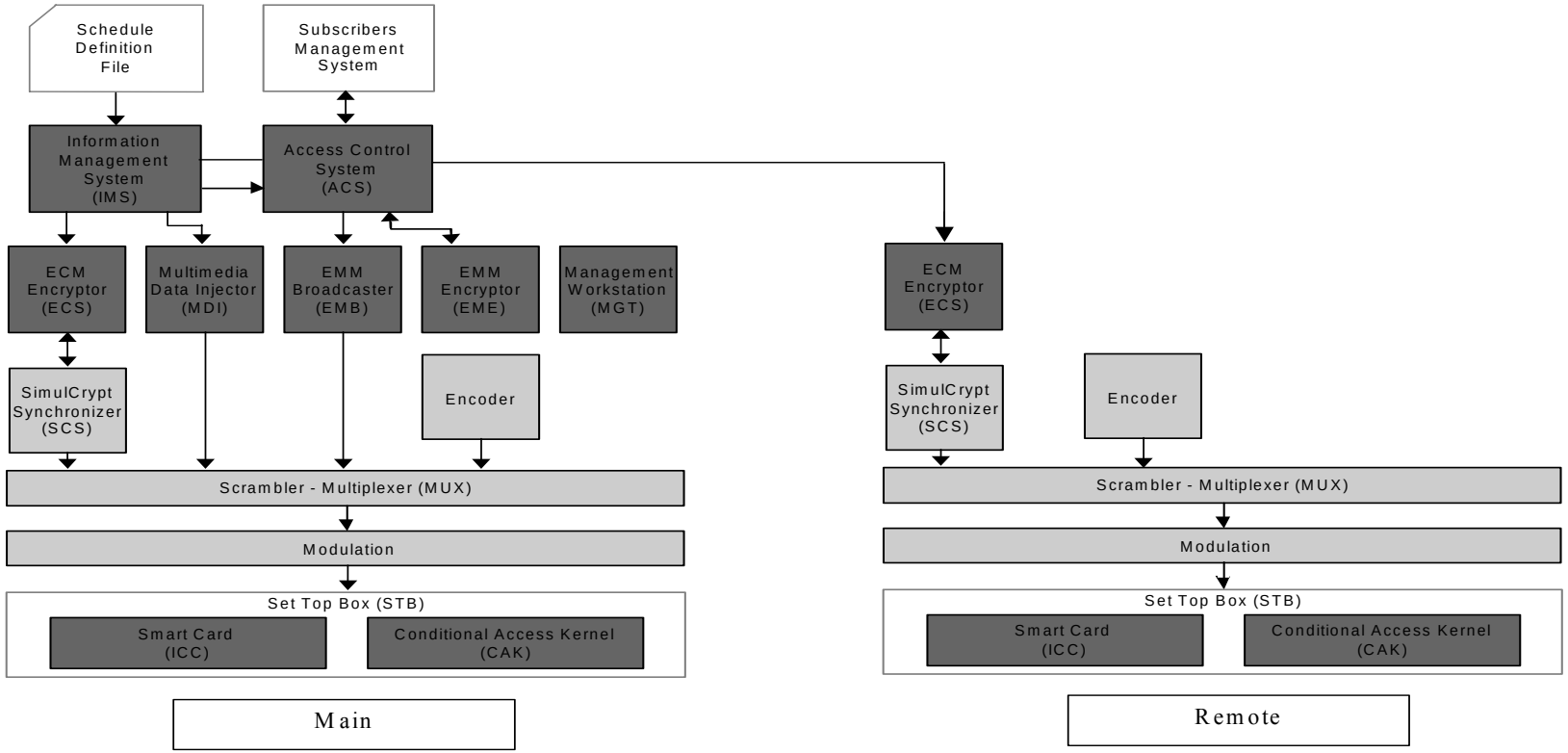

Fig. 3 Nagra CAS process overview

3.1.1 Information Management System (IMS)

The **Information Management System** (IMS) is a sub-system ensuring the dynamic link between the major sub-systems found in a digital pay-TV system. This link between sub-systems is focused on the product concept, i.e. entities shared between subscribers, marketing people and technicians. The IMS controls and follows the evolution of pay-events from their definition until their broadcast. It represents the DVB SimulCrypt "Event Information Scheduler" (EIS).
The IMS handles all the information needed to manage the broadcasting topology, the product profiles and the event profiles.
The IMS receives the schedule via XML files. Eastern MultiMedia Co. Ltd. is in charge of producing the XML files based on the schedules given by the turnaround channel providers.

The **ECM Encryptor** (ECS) is a device responsible for signal encoding security. It represents the DVB SimulCrypt "ECM Generator" (ECMG). It provides the SCS with ECMs according to the event definitions of the IMS. One ECS may simultaneously control up to 50 services assuming a crypto-period of 10 seconds for all non-VOD services. The ECS is secured by a mother smart card.
Every time a new event starts the ECS provides the profile of the event currently broadcast.

The **Multimedia Data Injector** (MDI) uses its DVB ASI output to feed the *Multiplexer* (MUX) with DVB SI tables, built from the schedule known by the IMS. It represents a combination of the DVB SimulCrypt "PSI/SI Generator" and of the "Custom SI Generator" (SIG). The SI data includes NagraVision private descriptors providing additional functionality to the *Set Top Box* (STB). The system generates the DVB SI tables according to the definitions currently supported and required by the STB.

3.1.2 Access Control System (ACS)

The **Access Control System** (ACS) translates instructions given by the *Subscriber Management System* (SMS) and forwards them to the decoder smart card. The SMS is linked to the *Access Control System* (ACS) via the Mediation Interface.

The **EMM Encryptor** (EME) encrypts messages in order to prevent any falsification or other abuse by pirates. This function is secured by a mother smart card.

The **EMM Broadcaster** (EMB) provides the *Multiplexer* with EMM messages. The EMB is designed to provide flexible transmission rates, with programmable priority, according to the instructions given by the ACS. It represents the DVB SimulCrypt EMMG.

3.1.3 Management Workstations (MGT)

NagraVision *Management Workstations* (MGT) provide Graphical User Interfaces (GUI) for the configuration and management of all other components of the system. The configuration and management applications allow performing:

- **System Management**
  - create/update transports
  - create/update services
  - create/update events
  - create/update products
  - create/update entitlements
- **Schedule Management**
  - schedule import and modification
  - display information on events
  - display access conditions
- **Product Management**
  - create/modify/publish products
  - synchronize products with the SMS
- **Topology Management**
  - retrieve topology from the multiplexing equipment
  - topology edition/validation

3.1.4 Conditional Access Kernel (CAK)

The NagraVision **Conditional Access Kernel** (CAK) is a software package designed to provide the decoder with all the security benefits of the smart card. It is the interface between the STB application software or middleware and the NagraVision CA.

3.1.5 Smart Card (SC)

The NagraVision **smart card** (SC) is the security device normally located inside the appropriate "smart card" reader connector of the STB. The smart card provides the security against piracy by making secrets inaccessible to a pirate.
NagraVision SC are based on a high performance secure micro-controller with a fast arithmetic unit.
NagraVision SC conform to the NFC 90-001 and ISO 7816 smart card standards.

3.2 Hardware Specification

3.2.1 Management Workstations (MGT)

NagraVision *Management Workstations* (MGT) are Intel Pentium platforms running Windows NT 4.
The MGT are identical and play no active role in the functions of the system. Their use is limited to configuration and monitoring of the system.
Scalability is achieved by increasing the number of workstations, as is redundancy.

3.2.2 UNIX components

All other components run on Compaq Alpha computers fitted with Compaq Tru64 UNIX. The hardware architecture of NagraVision solutions therefore ranges from small systems with most or even all components running on the same machine, to large platforms with dedicated hardware for each component. Migrating or duplicating one or more components to another machine achieves scalability.
The following diagram illustrates the hardware distribution for Eastern MultiMedia Co. Ltd.. The number of computers dedicated to each functional module is indicated in the diagram. As Eastern MultiMedia Co. Ltd. does not plan to use the return path at launch, the Call Collector is not included in the delivery. This module may be added as an option in a later stage.

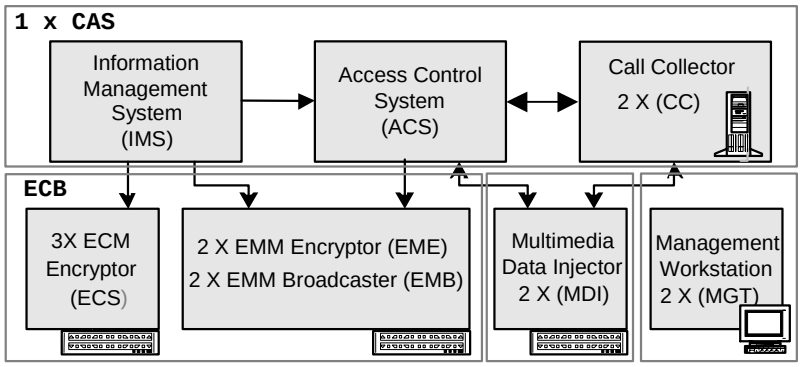

Fig. 4 CAS hardware blocks

3.2.3 CHE CAS Hardware view

Fig. 5 shows the deployed configuration of the Eastern MultiMedia Co. Ltd. redundant CAS in a hardware view. The position of the different modules into the racks does not represent the real configuration of the future racks.

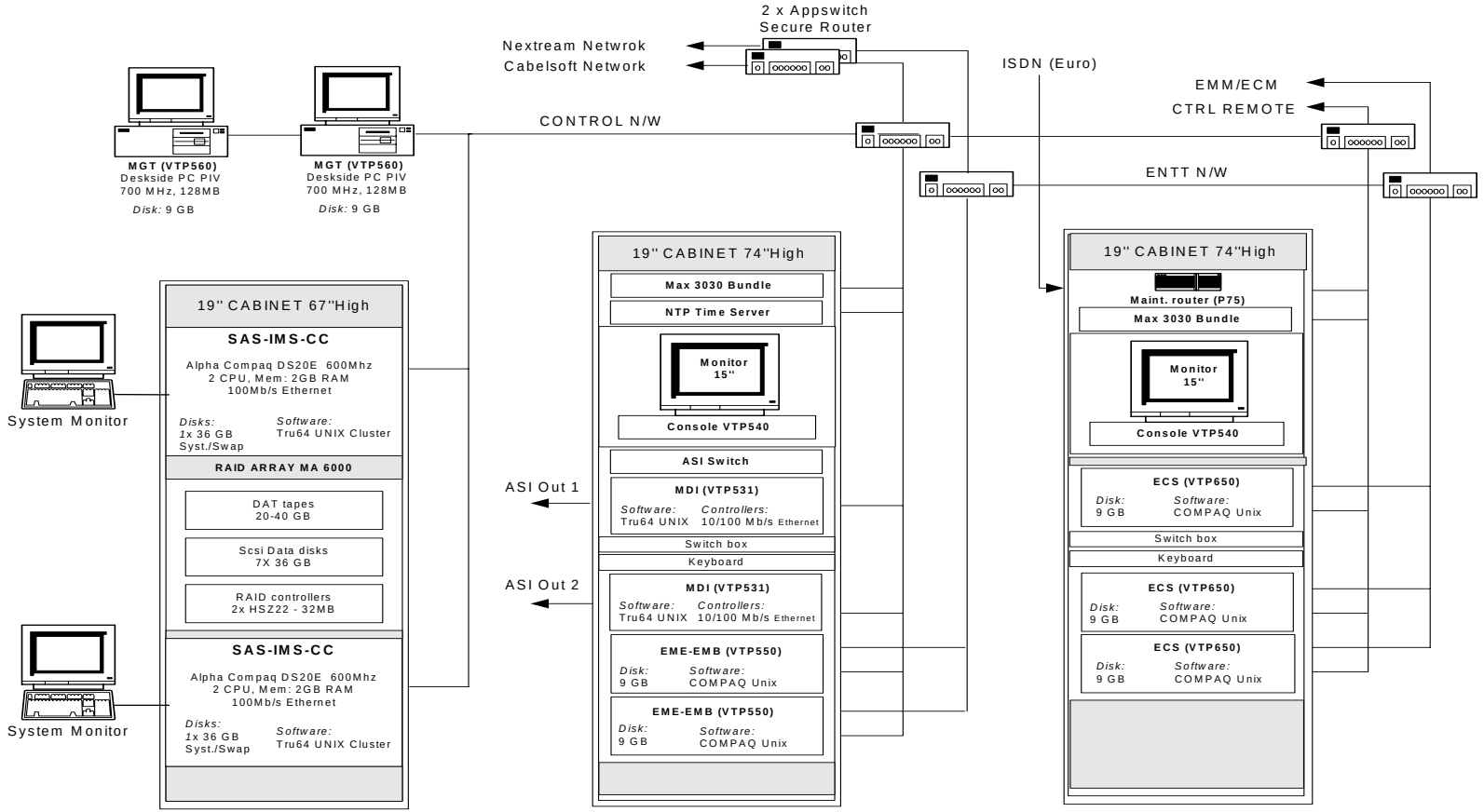

Fig. 5 CHE CAS hardware view

3.2.4 8 X RHE CAS Hardware View

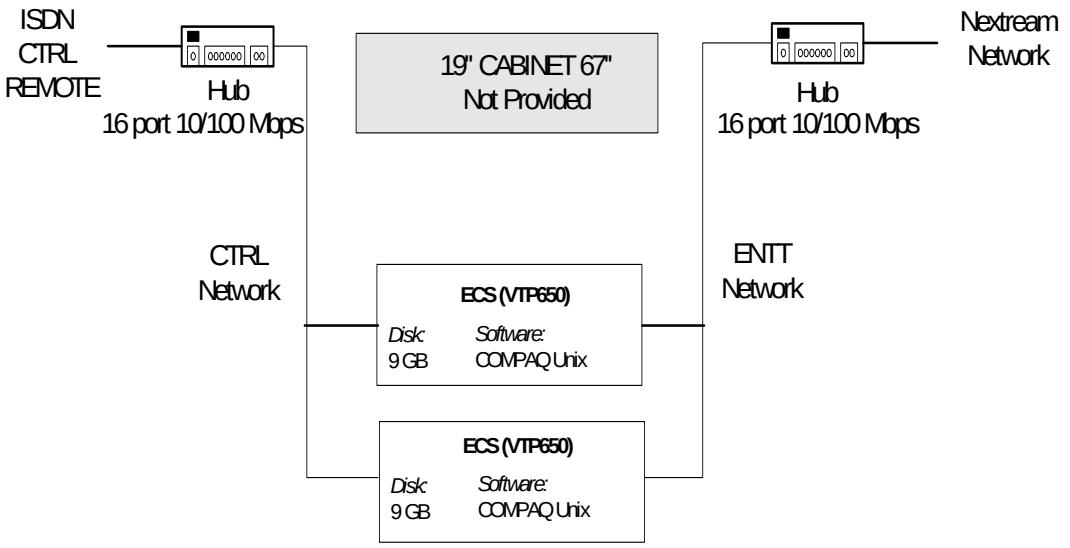

Fig. 6 CHE CAS hardware view

The above figure shows the configuration at the RHE. Please note that The equipment rack is not provided.

4. NagraVision System Interfaces

4.1 Interfaces schematic diagram

The following diagram presents the external interfaces to third party equipment available from the NagraVision CAS system. This diagram lists all interfaces used in the context of the CAS system for Eastern MultiMedia Co. Ltd. project.

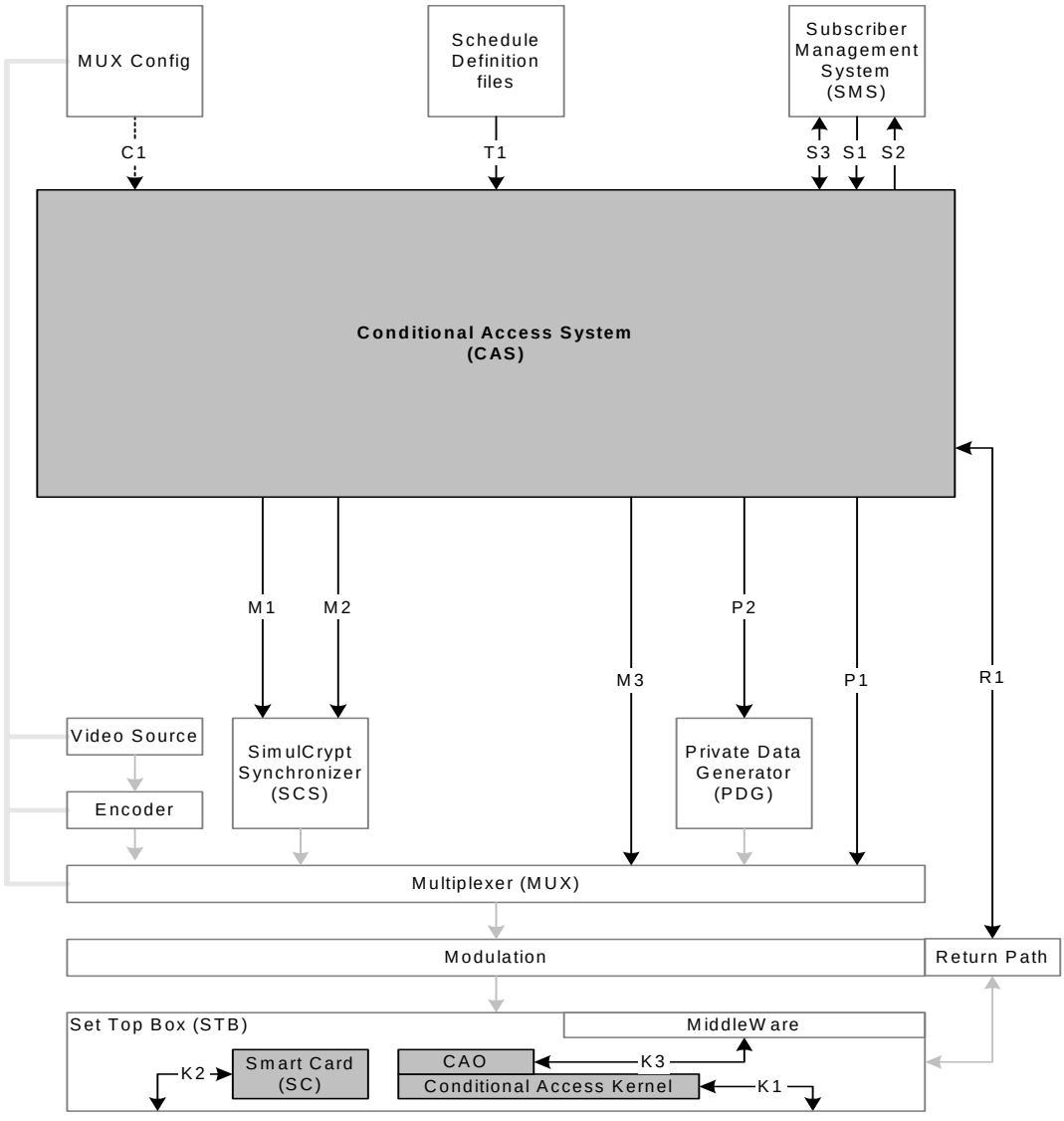

Fig. 7 CAS interfaces

A letter and digit pair identifies each interface, briefly described below:

4.1.1 MUX configuration

C1 This interface allows the CAS to acquire the network topology from the MUX configuration. The CAS uses the network topology data to build DVB SI data. TOPD is able to read a configuration file provided by the MUX equipment. However, this interface is not implemented by all MUX providers and therefore may not be available. In that case, the CAS must be configured manually using its own GUI interface

4.1.2 Set-top-box

K1 This represents the set of interfaces between the NagraVision **Conditional Access Kernel** (CAK) and the *Set-Top-Box* (STB).
Specification document:
(provided directly to the STB manufacturer)

K2 This represents the interface between the NagraVision **Smart Card** (SC) and the *Set-Top-Box*. In practice the STB only provides physical and basic data exchange connectivity, and the CAK handles the communication protocol with the card.
Specification document:
(provided directly to the STB manufacturer)

K3 This represents the **Application Programming Interface** (API) to the CAK for a specific middleware (for example CAO for OpenTV middleware).
Specification document:
StbCaoApi010800.pdf

4.1.3 Multiplexer

M3 This is the DVB SimulCrypt EMMG ↔ MUX interface.

M2 This is the DVB SimulCrypt ECMG ↔ SCS

M1 This is the DVB SimulCrypt EIS ↔ SCS interface.
Specification document:
DVB SimulCrypt; ETSI 197200 (latest version)

P1 The CAS injects SI data to the MUX through this interface.
This interface is DVB ASI.

P2 Private data file for external Private Data Generator (for example OpenTV streamer)

4.1.4 SMS

S1 This TCP connection is used to exchange commands between the SMS and the **Access Control System** (ACS) related to subscriber initialization and management. For example, “add the product X to the smart card Y”. The SMS has to maintain the relationship between subscribers and smart card identifiers, that is, to know that subscriber “Smith” has smart card Y.
The commands consist of fixed length text, as described in the SMS gateway interface specification. This interface corresponds to commands numbered 0 to 99 in this document.

S2 This second TCP connection between the ACS and the SMS is used by the ACS to forward to the SMS the feedback commands. The feedback commands correspond to the purchases of the subscribers, as collected by the Call Collector (CC). For example, “smart card Y purchased movie/product Z”.
Subscriber commands
The commands consist of fixed length text, as described in the SMS gateway interface specification. This interface corresponds to commands numbered 200 to 299 in this document.

S3 The SMS has to know the identifiers of products, so that, for example, it can mention on the subscriber bill the purchase of “Titanic” instead of product Z. This interface is used to communicate to the SMS the relationship between CAS product identifiers and event/programs they refer to.
This interface consists of a XML file generated by the IMS at regular intervals
Specification document:
IMS Data Exporter (XML File Interface) 2X1 specification; V1.0.0

4.1.5 Schedule data

T1 Schedule file provided by Eastern MultiMedia Co. Ltd.; XML file.
This interface consists of text files in XML containing the schedule for all services/channels on the network. The CAS uses the schedule to generate DVB SI (P1) and to build products
Specification document:
IMS; Schedule Importer (XML File Interface) Specifications; V1.1.1

4.2 SMS and CAS Interface

4.2.1 Secure Communication Link

As Eastern MultiMedia Co. Ltd. plan to install the SMS Server separate from the CAS room, they should then provide all the necessary equipment and effort to achieve a secure communication link between the SMS Server and the CAS. NagraVision shall validate the design and implementation of this link. The connection shall adhere to the SMS GWY specifications.

4.2.2 Software Interface

The logical interface between SMS and CAS consists in two pieces of software:

- SMS Gateway Interface (S1) & (S2):
  this interface receives and filters all the commands coming from the SMS Server
- SMS Output File Generator (S3):
  this is a XML file sent by the CAS to the SMS Server in order to pass on the product definitions generated with the Product Builder (PBL) module

As NagraVision provides the CAS only, Cablesoft shall take responsibility for the logical interfacing of these systems.

4.3 Schedule Information to CAS

Eastern MultiMedia Co. Ltd. needs to import the Schedule information for the Electronic Program Guide (EPG) into the CAS system.

Eastern MultiMedia Co. Ltd. imports schedule in XML format through NagraVision's Schedule Importer interface. NagraVision will provide the document "IMS Schedule Importer (XML File Interface) Specifications V1.1.1", so that Eastern MultiMedia Co. Ltd.'s input files are compatible with the CAS.

Eastern MultiMedia Co. Ltd. is also responsible for providing a FTP file server as specified in the Schedule Importer interface specification.

4.4 CAS to Multiplexers

4.4.1 Hardware

NagraVision is responsible for providing, within the CAS room, enough inputs and outputs for the signals that need to be exchanged with Nextream's equipment.
Hitron Technologies is responsible for providing the cables and any extra equipment necessary to carry the requested Ethernet and ASI signals between the CAS room and the Compression room.

4.4.2 Software

A number of software versions from Nextream have already been partially or totally tested in NagraVision's labs at Cheseaux (Switzerland). It is NagraVision's responsibility to make sure that Nextream uses compatible versions.

4.5 DVB-SI/PSI Management (CAS & Multiplexers to Decoder)

Nextream is responsible for generating and adding the MPEG-PSI information. This includes the necessary PSI descriptors for STB or Middleware.

NagraVision is responsible for generating and adding the DVB-SI Information.

DVB-SI information is generated and spooled using NagraVision's equipment. An ASI cable drives the resulting SI tables to Nextream's multiplexer.

4.6 Decoder to Smartcard

The decoder communicates with the smartcard using NagraVision's Conditional Access Kernel (see point 4.1). NagraVision takes the responsibility for this interface.

4.7 Multiple Headend System Configuration

NagraVision shall include in its delivery equipments for all headend sites that Eastern MultiMedia Co. Ltd. has indicated. NagraVision scope of responsibilities includes interface with compression equipments at all head ends and interface with SMS. Hitron Technologies scope of responsibilities includes providing a secure communication link between the sites for effective ECM, EMM and EPG information. This communication link shall be validated by NagraVision.

5. NagraVision System characteristics

This section lists the characteristics of the system according to the purchase order agreed between NagraVision and Eastern MultiMedia Co. Ltd..

System capacity of x Subscribers with y Services (capable to be upgraded to 1 million subscribers and 106 services).

5.1 CAS

5.1.1 Main Characteristics

Feature		Specification
# Software licenses subscribers		1 million
# Software licenses services		100
# Hardware sizing subscribers		1 million
# Hardware sizing services		100 for main, 8 x 50 for remotes
Services type	# Television Channels	100
	# Radio Programs	12
	# Data Stream, Protocol	0 (future deployment)
	# NVOD Channels	0 (future deployment)
	# VOD Channels	0 (future deployment)
Standard		DVB
Transmission medium		Cable
Redundant		Yes
Hardware characteristics	Power voltage	110 Vac
	Frequency	60 Hz
	Connector type	Euro
Maintenance telephone line type		ISDN, (type number : Euro)

5.1.2 Specific Features

Feature		Specification
PSI Generator		Nextream
SI	Generator	NagraVision
	Specific requirements	NO
EIT schedule		YES (7days)
	Home transport only	YES

Feature		Specification
	All transports	Nil
EPG language & char set		Mandarin & English
PPV		No (future deployment)
IPPV		No (future deployment)
	Type	PSTN
Return Path (Phone or Cable)		Yes
BTV		NO (future deployment)
Messaging		NO
Force Identification		NO
Teletext		YES
Head-end config.	Multi network (NITs)	YES
	Multi head-end/up-links	YES 8 remote sites
	Rebroadcast NV programs	YES
Multi time zone coverage		NO
DST		NO
Regional blackouts		YES
Product management		PBL full

5.2 Smartcards

Feature		Specification
Dnasp version(s)		11
UA range		To be defined
Part number		To be defined
Usage		Pay TV
Logo	Artwork (# color)	Black & White
	Artwork (# side)	1 side

5.2.1 Two sets of smartcard must be produced.

5.2.1.1 EMC Smart Cards

- Quantity = 30 k
- Multi-operator card
- Delivery Dateline : 15th September 2002

5.2.1.2 TV PLUS Smart Cards

- Quantity = 20 k
- Delivery Dateline : 15th September 2002
- Simulcrypt at TV PLUS

5.3 External Equipments

Feature		Specification
Mux	Manufacturer	Nextream
	SimulCrypt	YES
	# Mux	10 + 3
SMS	Manufacturer(s)	Cablesoft
STB	Manufacturer(s), protocol	Visionetics, Nokia Specifications in separate document
	Interactivity Middleware, Release	OpenTV
T&S	Manufacturer	NO

6. Nagra delivered equipment power consumption

6.1 CAS power consumption

6.1.1 Main Site

S/N	Model	Element	Qty	Power
1.	VTP 1250R/CAS	Redundant Alpha Server DS20	1	1600
2.	VTP 550 - EMEMB	EME-EMB	2	440
3.	VTP 650 - ECS	VTP 650 ECS	3	660
4.	APS-1	Secure Router (Appswitch 2500)	2	600
5.	VTP540-SWB 8	System Console with 8 pos switch	2	600
6.	TS-2	NTP Time Server	1	80
7.	P 75	1 ISDN Router for Maintenance	1	50
8.	HUB-10/100-16/RM	Rack mounted 16-port Hubs	6	180
9.	CAB-1	19" rack cabinet	2	-
10.	SC	Smart Card	50	-
11.	VTP531-MDI	Multimedia Data Injector	2	440
12.	ASI-R-SWT	ASI Switch for MDI redundancy	1	50
13.	VTP560-MGT	Management Workstation PBL-SCN-TOPD	2	240
14.	MTR-L15	Flat Screen Monitor	2	80
15.	Max 3030	Call Collector Modem	2	130
		Total Power consumption		5150

6.1.2 Remote Site X 8

S/N	Model	Element	Qty	Power
16.	VTP 650 - ECS	ECS	2	440
17.	HUB-10/100-16/RM	Rack mounted 16-port Hubs	2	60
		Total Power consumption		500

7. Deployment

7.1 Installation

NagraVision will include in its delivery the CAS. NagraVision scope of installation, inclusive of hardware and software, shall be confine to the CAS. NagraVision shall also provide interface specification for IMS Schedule Importer Specification , SMS gateway specification and SMS output generator specification.

7.2 Configuration

In order to insure the coherence of all the components that are essential for the functionality of the complete system , Eastern MultiMedia Co. Ltd. should define the following parameters:

7.2.1 Product Definition

Eastern MultiMedia Co. Ltd. shall define the:

a. Subscription
b. Bouquet definition
c. EIT Schedule
d. Teletext

7.2.2 Service Summary

Eastern MultiMedia Co. Ltd. shall define the:

a. 'L' Band Downlink Frequency
b. Symbol Rate
c. FEC
d. Network IDs
e. Bouquet ID

7.2.3 Channel Line Up

Eastern MultiMedia Co. Ltd. shall define:

a. Video PIDs
b. Audio PIDs
c. Number of Channels and their description
d. Teletext streams
e. EMM PIDs
f. ECM PIDs
g. PSI information
h. SI information

8. Roles and Responsibilities

8.1 Eastern MultiMedia Co. Ltd. Role

Eastern MultiMedia Co. Ltd. contracted Hitron Technologies as Main System Integrator (MSI) to deliver a complete DTV system. The role and the responsibilities of Eastern MultiMedia Co. Ltd. for NagraVision are:

a) **Facility Preparation** – to ensure the necessary site conditions including but not limited to air conditioning, earth protection, false flooring, UPS, generators, ceiling, cabling, implementation and architecture layout (racks, cabling connections, etc.).

b) **Site preparation** – Eastern MultiMedia Co. Ltd. is responsible to provide but not limited to the following sites: CAS room, Compression room, Broadcast room, Lab according to the relevant specifications of equipment vendors.

c) **Functional requirements** – to provide pre-requisite information necessary to build up the overall system. This includes but is not limited to detailed functional requirements, channel line-up, products definition, schedule information, etc.

8.2 Hitron Technologies Role

Hitron Technologies role is defined as the Main System Integrator (MSI) of this project. Its main tasks are:

a) The **Overall Program Management** of the project - to ensure a proper integration process of the vendors, partners and to meet project deadlines.

b) The **Vendors and Partners Management** - to ensure a coherent translation of Eastern MultiMedia Co. Ltd. requirements and expectations into the vendors scope of work. The number of players induces many dependencies among each other which have to be carefully managed. The vendors include but not limited to the compression equipment for main and remote sites, the STB middleware, STB, and the SMS. Hitron Technologies shall monitor the status of vendors and partners and compile weekly status reports for Eastern MultiMedia Co. Ltd. and partners.

c) **Network Infrastructure**- to ensure that the existing and future network complies with the existing and future requirements of Eastern MultiMedia Co. Ltd. Including but not limited to interfacing equipments between the transmission signal and its network. It also includes the IP network between Head-Ends and the “return-path” infrastructure.

8.3 NagraVision Role

NagraVision role for the project is vendor for CAS and integrator for the CAS interfaces.

8.3.1 NagraVision as CAS vendor

NagraVision will ensure the proper installation, configuration and detail testing of the CAS. Experienced resources have been provided to meet the deadlines proposed.

8.3.2 NagraVision as CAS System Integrator

NagraVision shall facilitate the design process between the associated vendors to ensure a coherent integration via the CAS interfaces. NagraVision is responsible for the coherence of all interfaces related to the CAS system namely the compression equipment, the SMS.

a) **Compression System –** NagraVision shall provide the interface integration with Nextream including EMM\ECM and SI information .

b) **SMS** – NagraVision shall support Cablsoft in the context of providing support up to SMS gateway interface. NagraVision shall validate the command matrix as generated by Cablesoft. NagraVision shall send a representative to provide on-site SMS gateway interface validation 2 weeks prior to system launch date. After the system launch date, NagraVision shall provide 20 hours support per month for 3 months or up to 60 hours whichever expires first.

c) **End-to-end tests** – to define and to manage the overall End-to-end test procedure with all vendors. The End-to-end tests will demonstrate that the system functionality covers the business requirements and system expectations.

8.4 Partners Roles

8.4.1 Ideal Role

Ideal Role for the project is vendor for Baseband Equipments. Namely, AV Routers, ASI Routers, SDI Converters, Analog to Digital Converters, Analog VDA, Digital VDA, jack fields, etc.

NagraVision and Hitron Technologies shall each nominate a representative in order to validate the modular SAT for the Baseband Equipments to be conducted by a trained Ideal Representative prior to the end to end integration tests.

The Modular SAT shall be conducted on the 1st September 2002.

8.4.2 Nextream Role

Nextream role for the project is vendor for the Compression Equipments. Nextream is responsible to provide all the compression equipments including but not limited to the Encoders, Multiplexers, QAM Modulators, ASI Distribution , network adaptors, etc.

NagraVision and Hitron Technologies shall each nominate a representative in order to validate the modular SAT for the Compression Equipments to be conducted by a trained Nextream Representative prior to the end to end integration tests.

The Modular SAT shall be conducted on the 4th of September 2002.

8.4.3 Cablesoft Role

Cablesoft Role for the project is vendor for the SMS. Cablesoft is responsible for communicating with EMC on their business models. They should translate the business model onto effective command matrix and source codes for interfacing with the CAS.

NagraVision and Hitron Technologies shall each nominate a representative in order to validate the modular SAT for the SMS gateway interface to be conducted by a trained Cablesoft Representative prior to the end to end integration tests

The modular SAT shall be conducted on the 1st September 2002.

8.5 Partners Responsibilities & Roles

8.5.1 Deliverables

It is the responsibilities of all partners to comply with the following deliverables :

- Statement Of Work,
- Architecture and System design,
- System documentation including user manuals, as-built documentation, test results and configuration data.
- Interfaces Specification documents,
- Implementation schedule,
- SAT specifications.

8.5.2 Responsibilities

- Supply all equipments related to the Bill of Material,
- Local installation and configuration,
- System testing and commissioning,
- Training.

8.5.3 System Integration

- Provide Technical support for performing end-to-end tests.

9. CAS System Acceptance Tests

NagraVision provides Eastern MultiMedia Co. Ltd. with a System Acceptance Tests document three weeks prior to the CAS acceptance tests. These tests are aimed at demonstrating that the Equipments provided by NagraVision have been installed, configured, integrated and brought into operational readiness for production services.

To reflect the real system operations, the SAT will as much as possible be carried out using the actual equipment such as SMS, muxes, STBs, etc. The respective partner providers should attend or be available during the SAT.

Each partner provider must have had his equipment certified for compliant integration with NV with the applicable software releases prior to the SAT. If any of the partner's equipment is not available or functional at time of SAT, NagraVision will either provide generic tested equipment or use simulators/analyzers to prove interface compliance. However, the system acceptance tests shall not be delayed due to not ready status of any partners.

10. End to End System Tests

NagraVision provides Eastern MultiMedia Co. Ltd. and Hitron Technologies with a End to End Integration Tests document three weeks prior to the Final System Integration Test .

The scope of the test comprise of CHE and 8RHE.

The test includes :

1. Compression Equipments
2. CAS
3. SMS gateway
4. STB and return Path

These tests are aimed at demonstrating that the equipments provided by all vendors under NagraVision's responsibility have been installed, configured, integrated and brought into operational readiness for production services.

Its is compulsory for all equipment vendors to have trained representatives at CHE and RHE attending the End to End tests.

11. Implementation schedule

The following project schedule lists the main steps of the project and will be updated in the Project Follow up document.

ID	Task Name	Duration	Start	Finish
1	**EASTERN MULTIMEDIA CO.**			
2	**EMC KICK-OFF MEETING**	5 days	Mon 29-04-02	Fri 3-05-02
3				
4	**CONTRACTS AND LEGAL MA**	**24 days**	**Thu 20-06-02**	**Tue 23-07-0**
8				
9	**CAS - NAGRAVISION**	**60 days**	**Mon 8-07-02**	**Fri 27-09-02**
10	**INTERNAL KICK-OFF MEETING**	1 day	Mon 8-07-02	Mon 8-07-02
11	**SYSTEM DESIGN**	**10 days**	**Mon 8-07-02**	**Mon 22-07-0**
28	**FACTORY SYSTEM INSTALLATION**	**10 days**	**Tue 23-07-02**	**Mon 5-08-02**
31	**FACTORY SYSTEM TEST**	**3 days**	**Tue 6-08-02**	**Thu 8-08-02**
33	**SITE INSPECTION**	2 days	Fri 9-08-02	Mon 12-08-0
34	**SHIPPING**	**7 days**	**Fri 9-08-02**	**Mon 19-08-0**
39	**SITE SYSTEM INSTALLATION**	**10 days**	**Tue 20-08-02**	**Mon 2-09-02**
51	**SITE SYSTEM INTEGRATION TEST**	**11 days**	**Tue 3-09-02**	**Tue 17-09-0**
59	**ON-SITE ACCEPTANCE TEST (SAT)**	2 days	Wed 18-09-02	Thu 19-09-0
60	**TRAINING**	**5 days**	**Fri 20-09-02**	**Thu 26-09-0**
63	**SIGN-OFF MEETING**	1 day	Fri 27-09-02	Fri 27-09-02
64	**SYSTEM SIGN-OFF**	0 days	Fri 27-09-02	Fri 27-09-02
65				
66	**PROJECT MANAGEMENT & S**	**110 days**	**Mon 29-04-02**	**Fri 27-09-02**

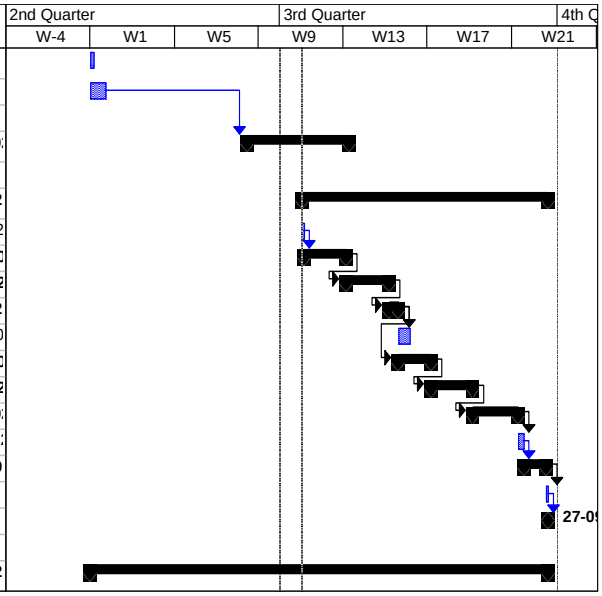

Table 2 Implementation schedule

The delivery time required from Geneva to Eastern MultiMedia Co. Ltd. site is about 2 weeks.

The development takes place in Cheseaux and the final integration on Eastern MultiMedia Co. Ltd. site.

12. Statement of Work Acceptance

By signing this document, both parties agree that the system shall be delivered as stipulated in this document. Eastern MultiMedia Co. Ltd. accepts Hitron Technologies and Nagravision proposal on the Statement Of Work.

12.1 Representative from NagraVision:

Signature: ._____.

Name: . Gary Kueh Chee Siong .

Designation: . Program Manager .

Date: ._____.

12.2 Representative from Hitron Technologies:

Signature: ._____.

Name: . Albert Chen .

Designation: . Project Manager .

Date: ._____.

12.3 Representative From Eastern MultiMedia Co. Ltd.

Signature: ._____.

Name: . Dr. Hsu Wu Hsiao .

Designation: . VP Chief Information Officer .

Date: ._____.

—— END OF DOCUMENT ——