SYSTEM SPECIFICATION FOR PROJECT LA FOR A MASS MONITORING SYSTEM FOR MOI ABU DHABI

DOCUMENT NO: J-LA-01- SSP-01
VERSION 1

(THIS DOCUMENT FORMS PART OF OFFER J-LA-01-OFR-01)

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Version History

Version	Date	Description
Version 1	5 February 2008	Andre Scholtz

Authorized distribution

Version	Description
Version 1	VASTech; MOI Abu Dhabi

Content

Executive Summary

Decision criteria

The offered MMS system uses the VASTech Zebra architecture and operationally proven Zebra Capture Units (ZCU) and Zebra Data Centres (ZDC) as system core to provide address the following decision criteria:

- Unique intelligence value, by capturing all traffic to allow the MOI to reach back in time to monitor previously unknown targets
- Protection of investment by providing an operationally proven concept that readily addresses changes in the communication, threat and technological environments
- Minimizing vendor hardware dependence by using commercially available servers and storage units
- Providing overall system flexibility and scalability to grow as operational and budget constraints dictate.

System capabilities

The MMS system provides the following high level system capabilities:

Interception

- Interception of all the traffic of more than 52 000 channels at 5 interception sites. These sites include:
    - International gateway at Site A1, with 49 000 channels
    - International gateways at mobile network Sites A2 and A3
    - Intelsat Site B1
    - Inmarsat Site B2

  The highly dense VASTech E1 and STM-1/STM-4 gateways are used at these interception sites to provide a very competitive and compact solution on these sites.

  As requested, minimal channel capacity has been provided at the satellite interception sites B1 and B2. The provision of complete satellite front-ends is included in this specification, including antennas. In all cases the channel capacity can be expanded to take advantage of the significant infrastructure requirements at the initial installations.

  All intercepted traffic is transferred, using Ethernet protocol, via optical links to the Central Site C1.

Capturing, processing and storage

- The intercepted traffic is captured, processed and stored at the Central Site C1. Given the assumed traffic parameters, the proposed system will handle the following rates:

	Rounded values
Calls per day	22,600,000
Daily voice minutes	64,500,000
Daily fax minutes	2,700,000
Daily data minutes	650,000

- Different storage options and on-line archiving options are provided, as summarized below:

Combination	Storage - all	Online Archive - targets	Total period – all IRI and content	Total period – target IRI and content
1	Option 1- 60 days	Option A – 1 year	60 days	14 months
2	Option 1- 60 days	Option B – 2 additional years	60 days	26 months
3	Option 2 – 365 days	Option A – 1 year	365 days	24 months
4	Option 2 – 365 days	Option B – 2 additional years	365 days	36 months

Some software features

Fax and data demodulation is implemented as a software solution in the Zebra system. Similarly, satellite digital decompression functionality is implemented as a software solution within Zebra. In both cases this approach provides significant cost and performance advantages to the customer.

A metadata analysis tool has been included in the specification, while the other analytical tools should be determined in consultation with the CUSTOMER. (However, the COMMERCIAL OFFER already makes provision for the acquisition of further analytical tools)

CIC mapping is included, to address the demands of large capacity SS7 interception

Advanced Operator Stations and Administrator Stations have been included to allow a variety of functions, including very accurate filtering and tight security configurations.

Specification iteration

It is suggested that this specification be updated after the high level system options in this document has been selected.

1 INTRODUCTION

1.1 Scope and layout of document

This document is the system SPECIFICATION for the Mass Monitoring System (MMS) for Project LA, for the MOI Abu Dhabi.

1.2 Confidentiality and distribution

This SPECIFICATION is provided in confidence and is authorized for distribution only to the parties indicated on page ii.

All documents shall be handled “TOP CONFIDENTIAL” as requested by the CUSTOMER.

1.3 Applicable and referenced documents

[1] Document number J-LA-01-OFR-01 “Offer to Ministry of Interior Abu Dhabi for Project LA Mass Monitoring System”. Document [1] forms the complete OFFER by reference to other documents. This SPECIFICATION is a subdocument of document [1] and not be read alone.

[2] Document number J-LA-01-COMO-01 “Commercial Offer for Project LA for a Mass Monitoring System for MOI Abu Dhabi”. Document [2] is the highest precedence of all the documents in the OFFER.

[3] Document number J-LA-01-URS-01, “Project LA User Requirements and Statement of Compliance”. Document [3] also includes the tender document “MMS Monitoring System (MMS) General Specifications Nov 2007”.

[4] Document number J-LA-01-PM-01 “Project Management Plan for Project LA for a Mass Monitoring System for MOI Abu Dhabi”. Document [4] addresses the project phases, project management issues, responsibilities and Statement of Work (SOW).

[5] Document number J-IMS-01-PRP-01 contains the Inmarsat specification.

[6] Document number J-ICU-01-PRP-01 contains the Intelsat System specification.

1.4 User requirements

The user requirements and the statement of compliance are stated in Referenced Document [3].

Various interpretations are possible of some important requirements. These different interpretations can lead to different system solution implementations, having vastly different consequences in terms of system scope, functionality and price.

Specific interpretations (for example the storage periods and traffic dimensioning) have been captured in this SPECIFICATION. In the case of conflict between the user requirements and this SPECIFICATION, the SPECIFICATION has precedence.

1.5 Project execution and phases

The actual implementation of the project will be done in phases, as indicated on a high level in Applicable Document [4].

1.6 Confirmation of assumptions and selection of options

The system solution has been prepared to be modular. In addition, different options have been offered. This flexibility enables the final solution to be adjusted to comply with budget and timescale constraints.

As far as possible, where assumptions have been made in this document, these assumptions have been indicated as such. The assumptions are not necessarily indicative of the functionality that can be offered by VASTech, but in an attempt to reduce possible different interpretations of requirements.

The CUSTOMER can order the system as stated in the OFFER. However, it is suggested that a next iteration of the following process is followed to ensure that a system solution is finally implemented that addresses the CUSTOMER'S schedule, performance and budget objectives.

First input: It is suggested that this SPECIFICATON is used as first input to the CUSTOMER.

Confirmed requirements: Following this input, further user requirements and design work sessions should be held between VASTech and the CUSTOMER to further adjust the system and select options to optimally fit the CUSTOMER requirements.

Detailed system engineering: The offered solution will be subject to detailed system engineering, following the confirmed requirements.

Continued support: VASTech offers its continued support and involvement in such further work sessions.

Price and schedule: Changes in the SPECIFICATION may have price and schedule implications.

2 SOLUTION OFFERED

2.1 Main functions

The main function of the MMS is to capture, store and present intercepts at

- International gateways, including gateways to GSM and UMTS networks
- Intelsat Earth Station
- Inmarsat Earth Station.

2.2 System architecture

2.2.1 System schematic block diagram

The high level system architecture of the MMS is shown in Figure 1. Please note the alpha-numeric indicators of each site, since these are used through this document.

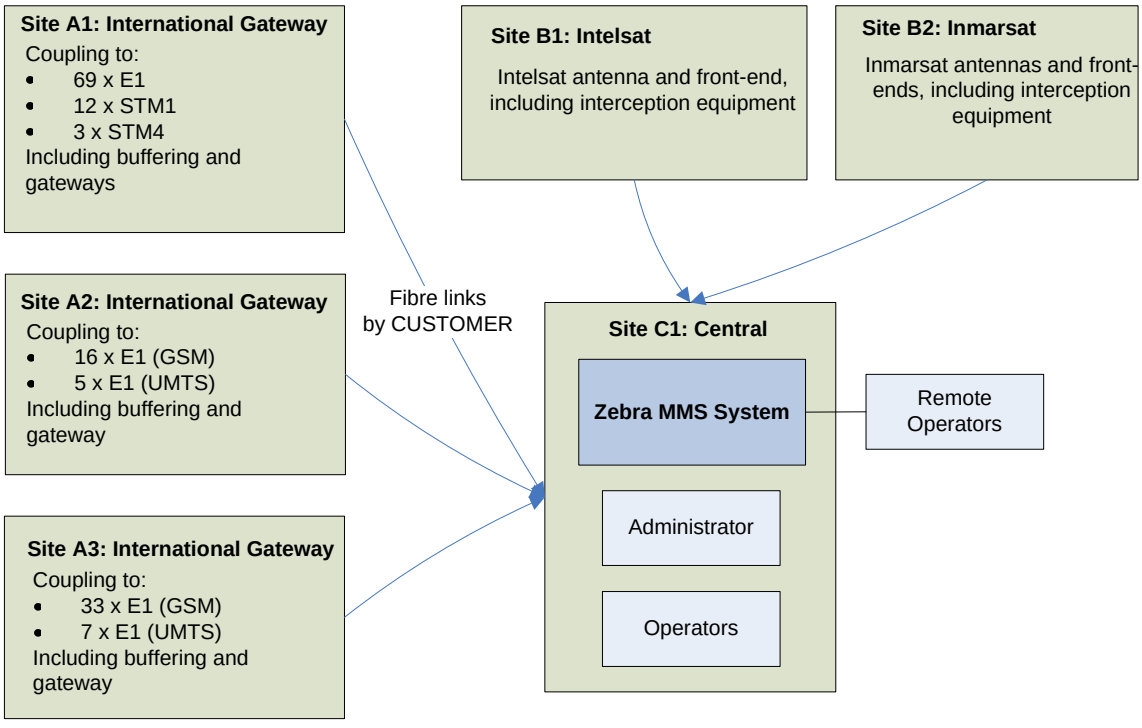


Figure 1: System Schematic Block Diagram of MMS

2.2.2 Overview

Different architectural options were considered. These are captured in "APPENDIX A: Trade-offs and design options" on page 56. In the case where the CUSTOMER may have the preference for one of the other options, this needs to be discussed in a workgroup with the CUSTOMER and the SPECIFICATION shall be updated.

According to the selected option, on which the rest of this SPECIFICATION is based, the Zebra Gateways and routing equipment will be deployed at the point of interception at the remote sites. The optic links between the remote sites and the central site will be provided by the CUSTOMER. The Zebra Capture Units (ZCU), providing real time functionality, will be deployed at the central site C1, together with a Zebra Data Centre (ZDC1) to provide an overall view of the intercepts from the different remote sites, and a ZDC-OA for long term online archiving of target intercepts.

This approach provides the following benefits:

- All Capture Units are located at the central site
- Minimal footprint is required at the remote sites
- Communication data is transferred via Ethernet to the central site.

The detail per remote site is described further in this section.

2.2.3 Data flow and storage

2.2.3.1 General

Figure 2 on page 6 indicates the data flow and storage principles that will be applied in the system.

Interception takes place at the remote sites (A1, A2, A3, B1, B2) of all traffic that the system is connected to. All content and signalling is transferred via CUSTOMER supplied fibre optic to the central site C1.

A number of Zebra Capture Units (ZCU) is installed at C1. Different storage options have been proposed. Pricing and installable items differ widely between the options. Content and IRI (also for uncompleted calls) for all the lines allocated to a specific ZCU, are stored in accordance with the selected storage option.

All the IRI of completed calls are moved to the Zebra Data Centre ZDC1, where it is stored for a similar period as the period of the selected storage option. The operators connect to ZDC1 to get a unified view of all the calls in the system. Provided that the operators have the correct security permissions, they can play back calls, or view fax and data sessions, via the ZDC1. During playback, content will be streamed from the relevant ZCU.

Two percent of all calls are considered to be targets, and are moved to the Zebra Data Centre Online Archive (ZDC-OA). The ZDC-OA will store all the IRI and content related to the target calls for a further period. The duration of this further period depend on the online archiving option selected. Operators can set target filters, or manually move additional target content to the ZDC-OA for long term online storage.

The storage can be expanded seamlessly by adding additional storage units and storage servers.

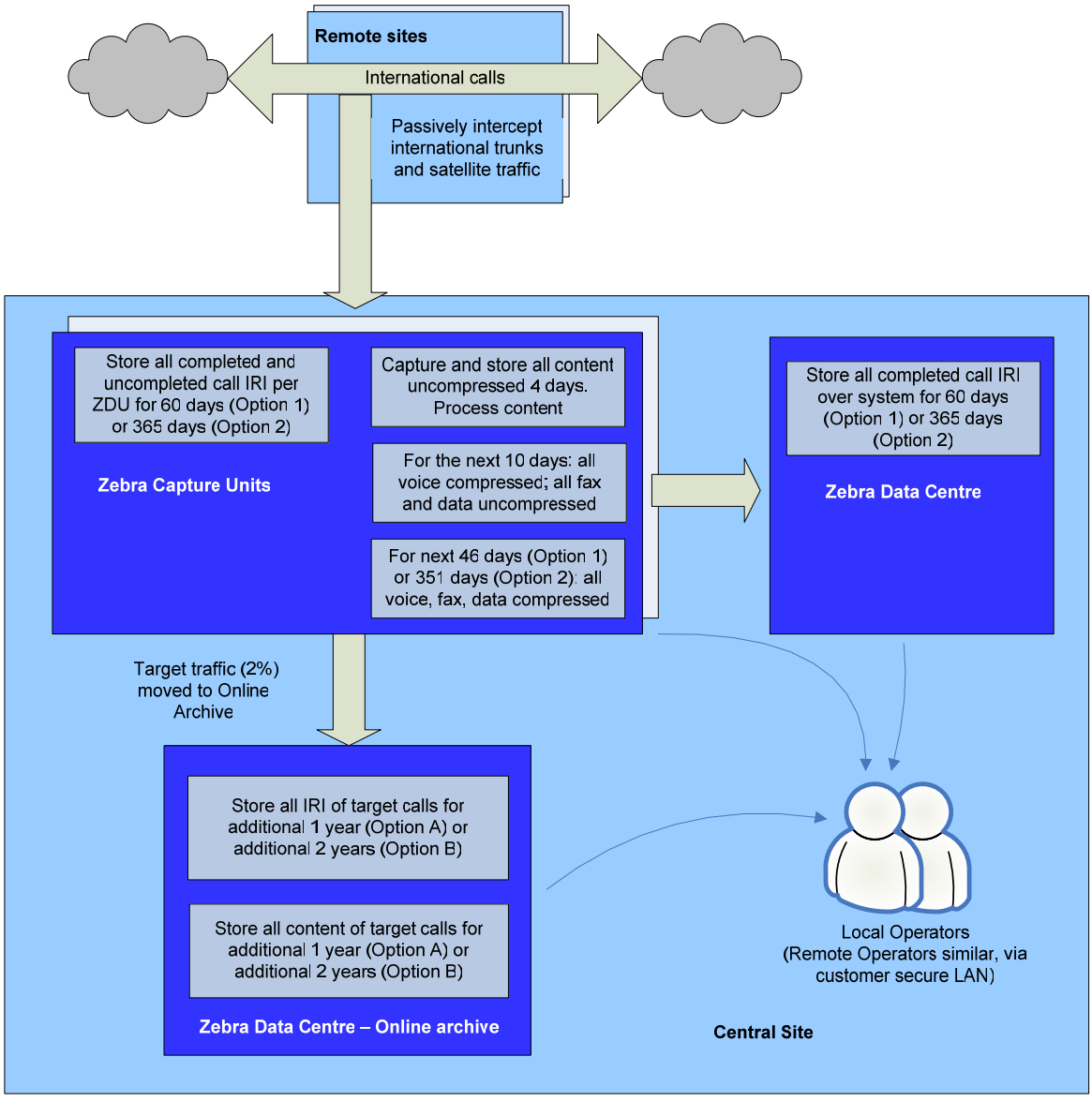


Figure 2: Data flow and storage

2.2.3.2 Storage options

2.2.3.2.1 Storage Option 1 – 60 days

- All storage is done in RAID 10 redundant format.
- All IRI, including IRI related to uncompleted calls, are stored for a period of 60 days.
- All content is stored for a period of 60 days, as follows:
    - First 4 days: All content remains uncompressed. This allows the maximum efficiency of speech tools and fax and data demodulators.
    - Next 10 days: All calls classified as voice is compressed at 8 kbps. All calls classified as fax and data remains uncompressed, to allow further processing.
    - Period up to 60 days in total: All content is compressed at 8 kbps.

2.2.3.2.2 Storage Option 2 – 365 days

- All storage is done in RAID 10 redundant format.
- All IRI, including IRI related to uncompleted calls, are stored for a period of 365 days.
- All content is stored for a period of 365 days, as follows:
    - First 4 days: All content remains uncompressed. This allows the maximum efficiency of speech tools and fax and data demodulators.
    - Next 10 days: All calls classified as voice is compressed at 8 kbps. All calls classified as fax and data remains uncompressed, to allow further processing.
    - Period up to 365 days in total: All content is compressed at 8 kbps.

2.2.3.3 Online archive options

2.2.3.3.1 Online Archive Option A – 1 additional year

All IRI and content related to the targets are stored for an additional 1 year. Content is stored at 8 kbps compressed. Storage is done in RAID 10 redundant format.

2.2.3.3.2 Online Archive Option B – 2 additional years

All IRI and content related to the targets are stored for an additional 2 years. Content is stored at 8 kbps compressed. Storage is done in RAID 10 redundant format.

2.2.3.4 Summary and selection of storage options

The different storage options have been provided due to the large difference in price and installable items. It must be noted that the storage and online archiving can seamlessly be upgraded by adding more storage units and the appropriate servers. All of these are available commercially off-the-shelve.

Different combinations of storage options and online archive options can be selected, as shown in the following table.

Combination	Storage - all	Online Archive - targets	Total period – all IRI and content	Total period – target IRI and content
1	Option 1- 60 days	Option A – 1 year	60 days	14 months
2	Option 1- 60 days	Option B – 2 additional years	60 days	26 months
3	Option 2 – 365 days	Option A – 1 year	365 days	24 months
4	Option 2 – 365 days	Option B – 2 additional years	365 days	36 months

2.2.4 Site A1: International Gateway

2.2.4.1 Inputs

Site A1 is the largest interception site. Interception of the traffic on the inputs, which are shown in the next table, will be done at A1.

Interface type	Interface quantity	Equivalent bi-directional E1 capacity
E1	69	69
STM1 (63E1)	12	756
STM4 (252E1)	3	756

2.2.4.2 Site A1 Schematic diagram and overview

Figure 3 shows the connections to be done at Site A1. Blue coloured items indicate items for supply by the CUSTOMER.

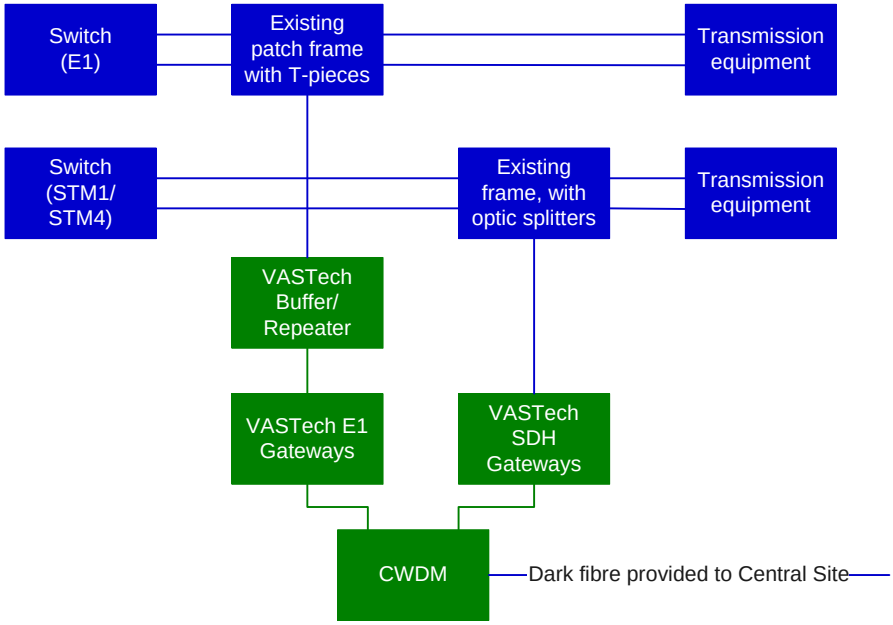


Figure 3: Coupling at Site A1

The VASTech Gateways convert all intercepted traffic to Ethernet. One 1 Gbps Ethernet interface per gateway is connected to the CWDM. All intercepted traffic is transferred via Ethernet to the Central Site C1, where it is allocated to different ZCUs and processed. The CUSTOMER shall provide a dark fibre optic, point-to-point, infrastructure between the site and C1. The dark fibre shall be redundant, following different routes. The final specifications of the optic link shall be provided by VASTech.

2.2.4.3 Connectivity and external interfaces

2.2.4.3.1 E1s

It is assumed that all connections are 75 ohm. A total of 69 bi-directional E1s will be connected.

Different options exist for coupling with the E1s are considered in "APPENDIX A: Trade-offs and design options" on page 56. This OFFER is based on the option where a T-connector will be used on the existing patch panel to provide an output to the VASTech Buffer-Repeater. The T-connector will be supplied by the CUSTOMER. Since only one of the 75 ohm connectors will be used in this option, the other is available for monitoring. Although this option has significant distance limitations (the maximum length of cable between the patch frame and the Buffer-Repeater is 10 m, i.e. the racks must be located very close together), this option is selected due to:

- No need to modify existing cables within the telecommunications route
- Clear division of responsibilities – no VASTech supplied equipment within the international telecommunications route.

If the distance limitations cannot be met, then Option 2, described in "APPENDIX A: Trade-offs and design options" on page 56, must be followed.

Figure 4 shows the VASTech Buffer-Repeater with a brush panel, through which the 75 ohm lines can be connected. This Buffer-Repeater has been installed operationally on international sites. Each 1U Buffer-Repeater can accept 8 bi-directional E1s (16 E1 inputs).

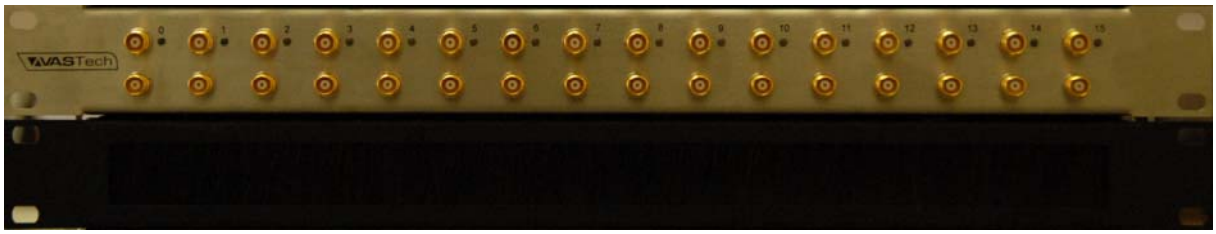


Figure 4: VASTech 75 ohm Buffer-Repeater with brush panel

2.2.4.3.2 STM1 and STM4

The CUSTOMER will provide and install splitters in the fibre optic STM1 and/or STM4 optic fibres and make the split output available to VASTech in a rack in the same room as the VASTech Gateways. The minimum output levels of the splitter, as made available to VASTech, will be specified by VASTech. The outputs from the splitters will be connected to the Zebra STM1/STM4 Gateways.

A total of 12 STM1 and 3 STM4 pairs will be connected.

2.2.4.3.3 Gateway to central site

Up to 16 Zebra Gateways can be connected via Ethernet to the CWDM Module, supplied by VASTech. The fibre optic output of the CWDM will be made available to the CUSTOMER/TELCO. The CUSTOMER must make available a redundant, point-to-point dark fibre between the Remote Site and the Central Site. These fibres must follow separate routes. The maximum transmission losses of these fibres will be specified by VASTech.

2.2.4.4 VASTech Gateways

The prime function of the gateways is to convert the input telecommunication signals to Ethernet traffic, without loosing content or signalling information.

The VASTech Gateways can be configured remotely via the Ethernet connection provided through the dark fibre.

Figure 5: Zebra E1/T1 gateway

The VASTech gateways have 128 E1/T1/J1 ports, or 4 x STM-1 or 1 x STM-4 connection capacity per 1 U height. This allows for a very compact and highly competitive interception solution at the different intercept sites.

2.2.4.5 Typical rack layout

A typical schematic rack layout for Site A1 is shown in Figure 6 on page 12.

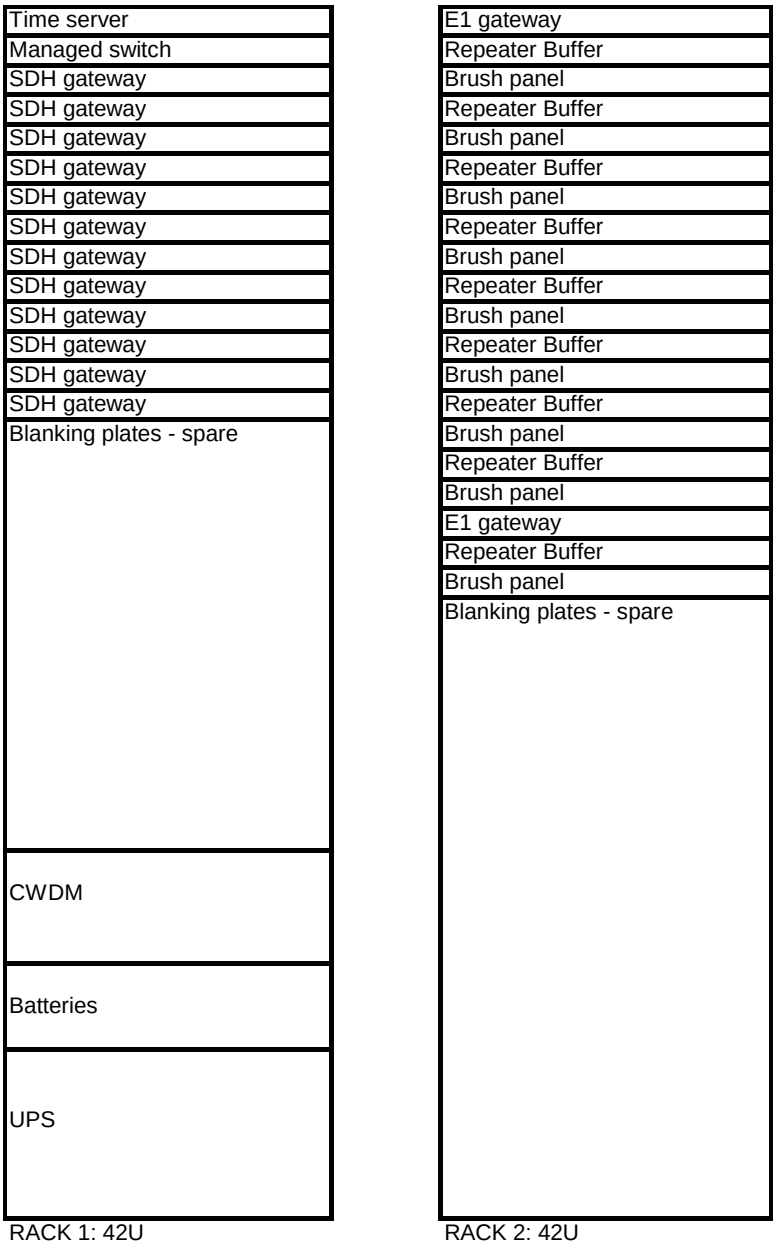


Figure 6: Typical rack layout Site A1

2.2.4.6 Responsibilities of supply

Note: the scope of supply has been divided in such a manner that the integrity of the international communications networks remains within the CUSTOMER/TELCO as far as possible.

2.2.4.6.1 Scope of supply of VASTech

- 19" racks
- E1 Buffer-Repeater units and patch panels
- VASTech Gateways

  A total of 14 VASTech Gateways will be installed, providing a spare connection capacity of 59 E1s.

  - E1 gateways.
  - STM1/STM4 gateways
- GigE-Fibre CWDM
- UPS with one hour capacity
- Managed switch
- Time server
- Installation training

2.2.4.6.2 Scope of supply of CUSTOMER

- Secure physical environment and space, including services such as electricity, air-conditioning. These will be specified by VASTech.
- 75 ohm T pieces for E1 lines and cable to VASTech Buffer Units (to be less than 10 m specifications)
- Optic splitters and fibre between splitter and STM1/STM4 gateways. Optic splitters and fibre output to be according to VASTech specifications.
- Actual installation work and commissioning at the remote sites, according to best practice including VASTech system specific training.
- Redundant point-to-point dark fibre between the remote sites and the central site, having the following characteristics (losses; routes, etc)

2.2.5 Site A2: International Gateway

2.2.5.1 General

Site A2 is aimed at intercepting the traffic from a mobile telephony provider. Interception will be done of the unencrypted SS7 traffic over the Media Gateway that connects to PLMN to the external communications environment. Later phases, not included in this OFFER, may include interception within the mobile network.

2.2.5.2 Input

Capture Unit 1
16 E1 (GSM) + 5 E1 (UMTS)

2.2.5.3 Site A2 Schematic diagram and overview

The installation layout at Site A2 will be similar to the installation at Site A1 (see par. 2.2.4.2 on page 9).

2.2.5.4 Connectivity and external interfaces

2.2.5.4.1 E1s

A total of 16 x E1 (GSM) and 5 x E1 (UMTS) will be connected.

Interception will be done of unencrypted SS7 traffic at the interfaces between the Public Land Mobile Network (PLMN) and other networks, such as the Public Switched Telephony Network (PSTN), at the gateway mobile services switching center (GMSC)

2.2.5.4.2 Gateway to central site

See par 2.2.4.3.3 on page 11. Due to the fact that only one Zebra gateway will be used, no CWDM will be implemented.

2.2.5.5 VASTech Gateways

One VASTech E1 Gateway will be used. See par 2.2.4.4 on page 11.

The VASTech E1 Gateway has a full capacity of 64 bi-directional inputs, allowing future expansion.

2.2.5.6 Typical rack layout

A typical rack layout is shown in Figure 7 on page 15.

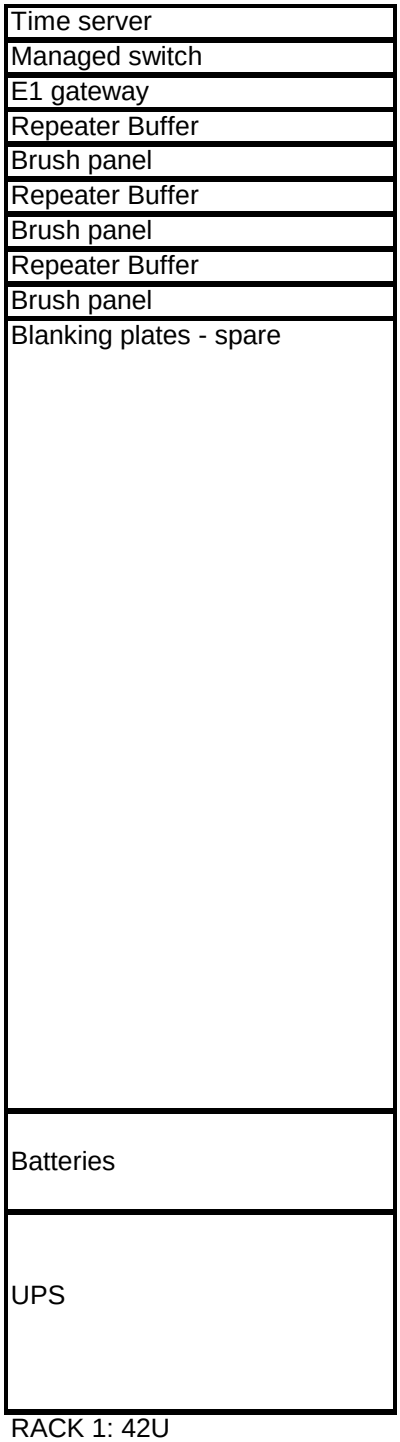


Figure 7: Typical rack layout site A2

2.2.5.7 Responsibilities of supply

2.2.5.7.1 Scope of supply of VASTech

- 19” rack
- E1 Buffer-Repeater units and patch panels
- VASTech E1 Gateway
- UPS with one hour capacity
- Managed switch
- Time server
- Installation training

2.2.5.7.2 Scope of supply of CUSTOMER

- Secure physical environment and space, including services such as electricity, air-conditioning. These will be specified by VASTech.
- 75 ohm T pieces for E1 lines and cable to VASTech Buffer Units (to be less than 10 m specifications)
- Actual installation work and commissioning at the remote sites, according to best practice including VASTech system specific training.
- Redundant point-to-point dark fibre between the remote sites and the central site, having the following characteristics (losses; routes, etc)

2.2.6 Site A3: International Gateway

2.2.6.1 General

Site A3 is aimed at intercepting the traffic from a mobile telephony provider. Interception will be done of the unencrypted SS7 traffic over the Media Gateway that connects to PLMN to the external communications environment. Later phases, not included in this OFFER, may include interception within the mobile network.

2.2.6.2 Input

Capture Unit 1
33 E1 (GSM) + 7 E1 (UMTS)

2.2.6.3 Site A2 Schematic diagram and overview

The installation layout at Site A3 will be similar to the installation at Site A1 (see par. 2.2.4.2 on page 9).

2.2.6.4 Connectivity and external interfaces

2.2.6.4.1 E1s

A total of 33 x E1 (GSM) and 7 x E1 (UMTS) will be connected.

Interception will be done of unencrypted SS7 traffic at the interfaces between the Public Land Mobile Network (PLMN) and other networks, such as the Public Switched Telephony Network (PSTN), at the gateway mobile services switching center (GMSC)

2.2.6.4.2 Gateway to central site

See par 2.2.4.3.3 on page 11, excluding the use of a CWDM due to the fact that only one Zebra Gateway is used on the site.

2.2.6.5 VASTech Gateways

One VASTech E1 Gateway will be used. See par 2.2.4.4 on page 11.

The VASTech E1 Gateway has a full capacity of 64 bi-directional inputs, allowing future expansion.

2.2.6.6 Typical rack layout

The typical rack layout is similar to the schematic rack layout shown in Figure 7 on page 15. Additional Buffer-Repeater units and brush panels will be supplied.

2.2.6.7 Responsibilities of supply

The responsibilities of supply, for Site A3, are similar to those listed for Site A2 in par 2.2.5.7 on page 16.

2.2.7 Site B1: Intelsat

2.2.7.1 General

The goal of Site B1 is to establish an Intelsat interception facility that is upgradeable. The initial intercept capacity of the Intelsat System is the equivalent of 32 bi-directional E1s.

Due to the fact that no site survey and electromagnetic environmental analysis have been done, it is assumed that Site B1 may be at a different location to the Central Site C1.

2.2.7.2 Intelsat system specification, options and deliverable items

The specification for the offered Intelsat system is captured in document number J-ICU-01-PRP-01. This document also addresses the offered Satellite Signal Analysis system.

The rest of this section addresses the interface requirements between the Intelsat site and the Central Site.

2.2.7.3 Interfacing between Sites B1 and C1

2.2.7.3.1 Operation

The Intelsat system shall output SS7 communications traffic to the Buffer-Repeater units, which are connected to the VASTech Gateway.

The VASTech Gateway shall convert the communications traffic into Ethernet, for transfer via the CWDM, via CUSTOMER supplied optical link, to the Central Site C1. Note that some of input E1s may carry compressed signals. Decompression of the compressed DCME inputs signals shall be done at the Central Site. See document J-ICU-01-PRP-01 for the types of DCME that are supported through this OFFER.

Due to the fact that the type and number of DCME compressed signals are unknown, the exact number of physical E1s cannot be specified at this stage. However, the system has been dimensioned to accommodate the equivalent of 32 uncompressed bid-directional E1s.

2.2.7.3.2 Connectivity and external interfaces

2.2.7.3.2.1 E1s

Due to the fact that the type and number of DCME compressed signals are unknown, the exact number of physical E1s cannot be specified at this stage. However, the system has been dimensioned to accommodate the equivalent of 32 uncompressed bid-directional E1s.

Provision will be made to allow the physical connection of up to 32 bi-directional E1s.

2.2.7.3.2.2 Gateway to central site

See par 2.2.4.3.3 on page 11.

2.2.7.4 VASTech Gateways

One VASTech E1 Gateway will be used. See par 2.2.4.4 on page 11.

The VASTech E1 Gateway has a full capacity of 64 bi-directional inputs, allowing future expansion.

2.2.7.5 Typical rack layout

The typical rack layout is similar to the schematic rack layout shown in Figure 7 on page 15, with the following exceptions:

- VASTech 120 ohm Buffer Modules will be provided, rather than 75 ohm Buffer-Repeater units and brush panels.
- Installation may be done within other racks that are supplied under the Intelsat System, subject to final engineering considerations.

2.2.7.6 Responsibilities of supply – interfacing

The following responsibilities only address those related to interfacing between Site B1 and the C1.

2.2.7.6.1 Scope of supply of VASTech

- 19” rack space
- VASTech 120 ohm Buffer Modules
- VASTech E1 Gateway
- GigE-Fibre CWDM
- UPS with one hour capacity
- Managed switch
- Time server
- Actual installation work

2.2.7.6.2 Scope of supply of CUSTOMER

- Secure physical environment and space, including services such as electricity, air-conditioning. These will be specified by VASTech.
- Redundant point-to-point dark fibre between the remote sites and the central site, having the following characteristics (losses; routes, etc).

2.2.8 Site B2: Inmarsat

2.2.8.1 General

The goal of Site B2 is to establish an Inmarsat interception facility, intercepting communications from the two Inmarsat satellites covering the Atlantic Ocean East and Indian Ocean.

Due to the fact that no site survey and electromagnetic environmental analysis have been done, it is assumed that Site B2 may be at a different location to the Central Site C1. It is assumed that it will be on the same site as Site B1 (Intelsat).

2.2.8.2 Inmarsat system specification, options and deliverable items

The specification for the offered Inmarsat system is captured in document number J-ICU-01-PRP-01.

The rest of this section addresses the interface requirements between the Inmarsat site and the Central Site.

2.2.8.3 Interfacing between Sites B2 and C1

2.2.8.3.1 Operation

The Inmarsat system will output the intercepted data directly in on a LAN, using the Ethernet protocol.

The LAN shall be connected to the CWDM that is provided for Site B1. The traffic shall be transferred to the Central Site C1, sharing the infrastructure that has been provided for Site B1.

2.2.8.4 Responsibilities of supply – interfacing

The following responsibilities only address those related to interfacing between Site B2 and the Central Site C1. Provided that the interfacing infrastructure for Site B1 has been provided:

- The CUSTOMER has not interfacing responsibilities related to Site B2
- VASTech shall execute installation services.

2.2.9 Site C1: Central Site

2.2.9.1 Introduction

2.2.9.1.1 General

The main functions of the Central Site C1 are as follows:

- Receive and process intercepts from remote sites
- Store IRI and content of all intercepts
- Provide an overall administrative function, and detailed operator functions to allow the extraction of intelligence from the stored intercepts
- Provide a long-term on-line archive of IRI and content related to targets.

2.2.9.1.2 Options

The following main options have been provided in this SPECIFICATION:

- Different storage periods
- Different long-term online archiving periods

Additional lower level options have been pointed out, where applicable.

2.2.9.2 Schematic diagram

Site C1 provides a single access point to all the intercepts that have been made at the different sites

Figure 8 on page 22 provides a high level schematic diagram of the Central Site. The final site architecture is subject to confirmation of requirements and detailed system engineering. Numbering of ZCUs refer to the site names given in Figure 1 on page 4).

The Central Site can be implemented in phases and can readily be scaled to address specific operational, budgetary, performance and timescale criteria.

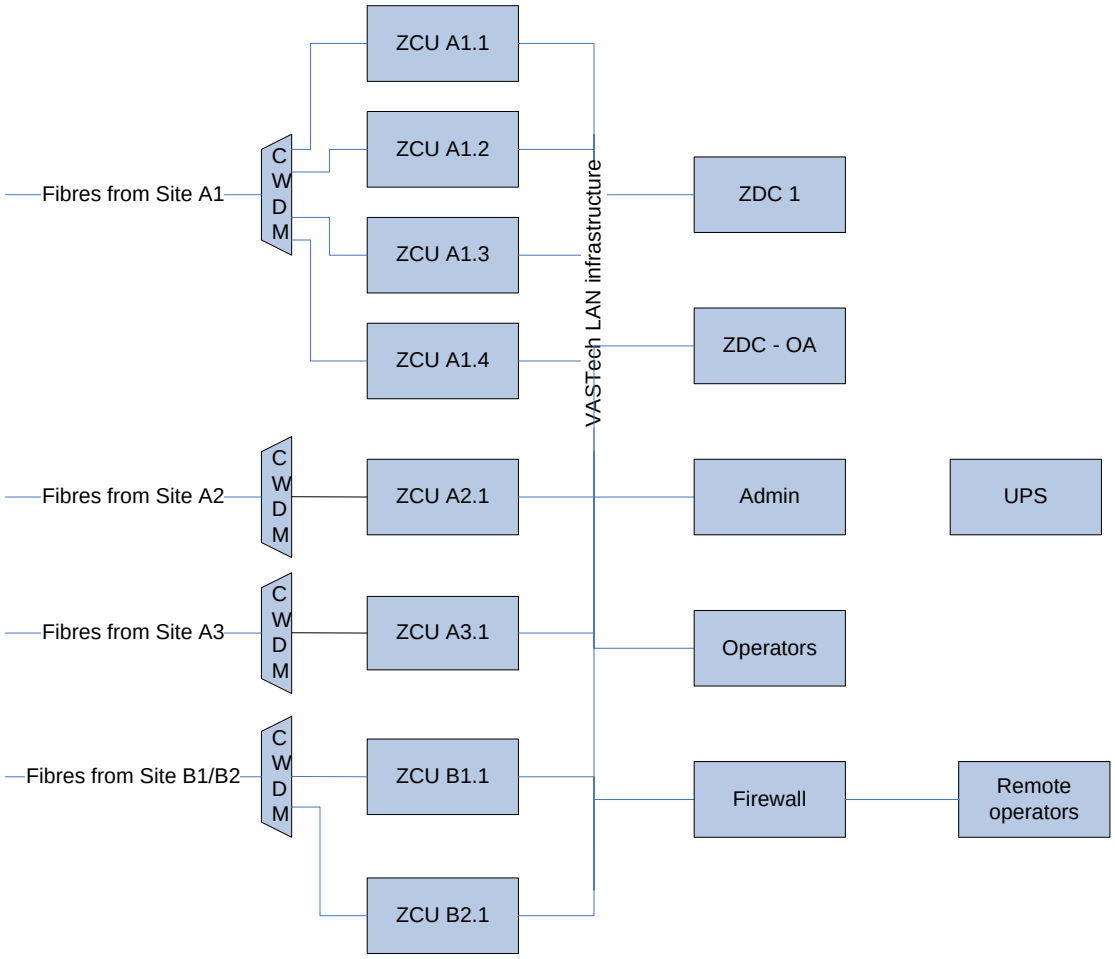


Figure 8: Central Site Schematic Diagram

2.2.9.3 External interfaces

2.2.9.3.1 CWDM

The intercepted traffic is provided via redundant point-to-point dark fibre links, which will be provided by the CUSTOMER. Each of the CWDM units, provided by VASTech, splits the fibre inputs into a number of Gbps outputs, to a maximum of 16 Gbps (GigE) outputs per CWDM. These GigE outputs are connected to the Zebra Capture Units (ZCU).

2.2.9.3.2 Secure LAN to remote operators

The CUSTOMER will provide secure LAN access to remote operators. VASTech will supply the firewall server as well as firewall software. The CUSTOMER may take part in the final configuration of the firewall to satisfy itself that a high level of security is achieved.

2.2.9.4 Zebra Capture Units

2.2.9.4.1 Overview

Each ZCU will provide the following functions:

- Recording all calls on the monitored lines
- Demodulation and decoding of fax and internet sessions
- Storing of all sessions in accordance with the storage option selected (see par. 2.2.3 on page 5)
- Compression
- Distribution of all completed call IRI to ZDC-1 and all target content and IRI to ZDC-OA
- In addition, optional speech processing and analytical functionality will also be used at the ZCU (see par. 2.4 on page 49)

For the purpose of the high level MMS schematic diagram (Figure 8 on page 22), the ZCU will also include the necessary Ethernet infrastructure for integrating the different ZCU modules internally, and with the CWDM.

2.2.9.4.2 ZCU Schematic diagram

The schematic block diagram (SBD) of a typical ZCU is shown in Figure 9 on page 24.

2.2.9.4.3 Quantities

A total of 8 ZCUs will be provided. The installable components per ZCU will differ, depending on the interception site that is supported, as well as on the storage option selected. Quantities are subject to final detailed system engineering.

It is suggested that the project be implemented in phases, to be discussed at a work session between VASTech and the CUSTOMER.

Table 1: Storage option 1: racks and power – ZCUs

	ZCU A1.1	ZCU A1.2	ZCU A1.3	ZCU A1.4	ZCU A2.1	ZCU A3.1	ZCU B1.1	ZCU B2.1	Other	Total
Number of racks, including connection	7	7	7	2	1	1	1	1	1	28
Content storage RAID 10 [TB]	340	340	340	60	20	40	40	20		1200
kW peak	36	36	36	9	4.5	8.5	5	4.5	3	142.5

Table 2: Storage option 2: racks and power – ZCUs

	ZCU A1.1	ZCU A1.2	ZCU A1.3	ZCU A1.4	ZCU A2.1	ZCU A3.1	ZCU B1.1	ZCU B2.1	Other	Total
Number of racks, including connection	13	13	13	3	1	2	2	1	1	49
Content storage RAID 10 [TB]	1460	1460	1460	200	80	120	100	40		4920
kW peak	92	92	92	15	12.5	11	11	5.5	3	334

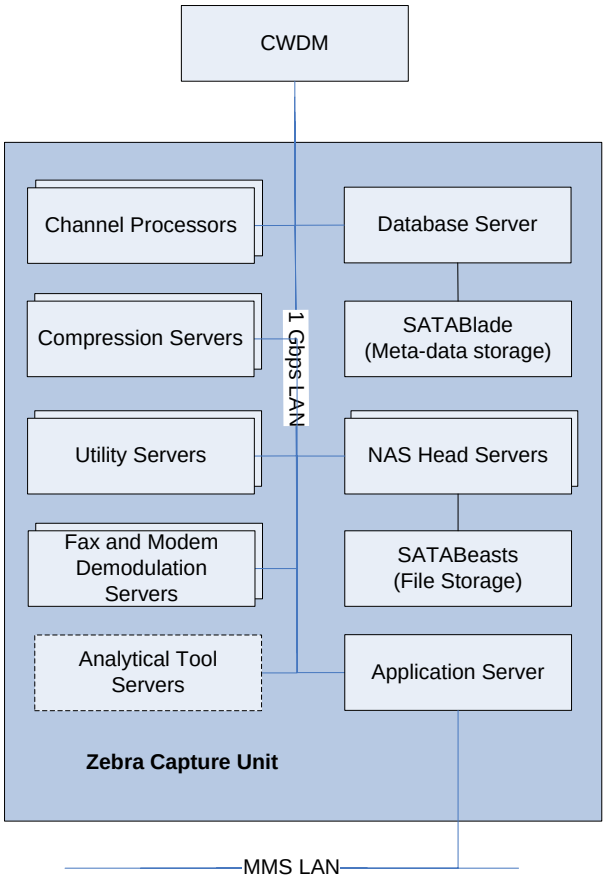


Figure 9: ZCU schematic diagram

2.2.9.5 Zebra Data Centres

2.2.9.5.1 Overview

Two different types of ZDCs are provided:

- Zebra Data Centre (ZDC1):
  - This ZDC1 will provide a unified view over all intercepts in the system. Operators will connect to the MMS via the ZDC.
  - The ZDC1 does not change materially as a result of different content storage and/or archiving options.
- Zebra Data Centre for Online Archiving (ZDC-OA):
  - The ZDC-OA provides online archiving functionality for target content and IRI. The online archive period depends on the archive option selected (see par. 2.2.3 on page 5). The selection of an on-line archiving capability provides significant advantages, when compared to other media.
  - It is estimated that 2% of all intercepted target traffic will be archived online.

2.2.9.5.2 Quantities

The following quantities are subject to final detailed system engineering.

It is suggested that the project be implemented in phases, to be discussed at a work session between VASTech and the CUSTOMER.

Two different combinations of ZDC-1 (System Data Centre) and ZDC-OA (Online Archive) are shown in the following two tables. Only content storage is included.

Table 3: ZDC-1 plus 1 year online archiving (ZDC-OA)

	ZDC1	ZDC-OA	Total
Number of racks, including connection	1	2	3
Content storage RAID 10 [TB]	0	100	100
kW peak	4.5	10	14.5

Table 4: ZDC-1 plus 2 years online archiving (ZDC-OA)

	ZDC1	ZDC-OA	Total
Number of racks, including connection	1	2	3
Content storage RAID 10 [TB]	0	200	200
kW peak	4.5	15	19.5

2.2.9.6 Dimensioning

2.2.9.6.1 General for all communications in system

The following dimensioning is generally applicable to the system, regardless of option selected. “Max fax queue” or “Max data queue” refers to the maximum length of the queue. Calls related to known targets can be prioritized for demodulation.

Other	
Number of workstations	41
Max fax queue length (h)	12
Max data queue length (h)	12

2.2.9.6.2 Storage option 1: 60 days

Lifetimes	
Number of days voice media online - uncompressed	4
Number of days fax/data media online - uncompressed	14
Number of days media online - compressed	56
IRI lifetime (days)	60
Compression	
Compressed format	stereo 8 kbps
Percentage of voice calls compressed	100.00%
Percentage of fax/data calls compressed	100.00%
Traffic characteristics	
Fax percentage of call minutes	4.0%

Data percentage of call minutes	1.0%
Number of busy hours per day	24
Channel utilisation during busy h	90%
Channel utilisation during off-peak	0%
Average call duration during busy h (minutes)	3
Average call duration during off-peak (minutes)	3
Average fax call duration (minutes)	3
Ratio of unconnected:connected calls	4

2.2.9.6.3 Storage option 2: 365 days

Lifetimes	
Number of days voice media online - uncompressed	4
Number of days fax/data media online - uncompressed	14
Number of days media online - compressed	361
IRI lifetime (days)	365
Compression	
Compressed format	stereo 8 kbps
Percentage of voice calls compressed	100.00%
Percentage of fax/data calls compressed	100.00%
Traffic characteristics	
Fax percentage of call minutes	4.0%
Data percentage of call minutes	1.0%
Number of busy hours per day	24
Channel utilisation during busy h	90%
Channel utilisation during off-peak	0%
Average call duration during busy h (minutes)	3
Average call duration during off-peak (minutes)	3
Average fax call duration (minutes)	3
Ratio of unconnected:connected calls	4

2.2.9.7 Protocols supported

The protocols in Table 5 will be supported initially.

Table 5: Supported protocols

	Recording		Fax Detection		Data Detection	
Protocol	Stereo	Mono	Stereo	Mono	Stereo	Mono
SS7 ISUP	Y	Y	Y	Y	Y	N
SS7 TUP	Y	Y	Y	Y	Y	N
SS5	Y	Y	Y	Y	Y	N
VOX	Y	Y	Y	Y	Y	N
H.323 (Intl GW)	Y	Y	Y	Y	Y	Y
SIP (Intl GW)	Y	N	Y	N	Y	N

In addition, the interception of hyper-channels or 2 Mbps streams will be supported to the equivalent of a 2 Mbps stream, optionally expandable.

H.323 and SIP are applicable in the case of VoIP traffic between international gateways.

Additional protocols will be provided under the optional Software Maintenance and Upgrade Option (see OFFER).

Interception of encrypted signalling schemes is not supported. However, in the case where the signalling is not encrypted, while content is encrypted, the encrypted content will be captured and stored in encrypted format.

2.2.9.8 Responsibility of supply

2.2.9.8.1 VASTech

- Execution of delivery, installation and commissioning of the system specified in this SYSTEM, subject to further work sessions and detailed system engineering.

2.2.9.8.2 CUSTOMER

- Provision of secure and safe physical environment for storage and installation of all equipment. Note also the space requirements for a separate UPS room at the Central Site C1.
- Provision of electricity and air conditioning in the equipment rooms, in accordance with environmental specifications to be provided by VASTech
- Provision of secure dark fibre between remote sites and Central Site C1, in accordance with specifications to be detailed by VASTech
- Secure ADSL access for remote operators.

2.3 Functionality and characteristics

2.3.1 Introduction

The proposed Zebra MMS system uses the most modern architecture and development approach to provide the following significant benefits to the customer:

- **Unique intelligence**

  A key feature of the Zebra system is that it records all traffic. This provides the unique advantage that the CUSTOMER can back in time to listen to specific calls, from previously unknown targets.

- **Protect investment**

  The threat environment, communications environment and technology continue to change. VASTech addresses these challenges uniquely:

  - Zebra uses a modern architecture to benefit of the latest commercial off-the-shelve hardware to get most cost effective performance
  - Software centric allows to readily add new protocols and analytical tools

- **High levels of capacity, flexibility and scalability**

  Zebra provides high levels of scalability and capacity. Readily scale through adding additional capture units, or more commercial software.

- **Low vendor support dependence**

  The hardware vendor dependence is limited to the VASTech gateway. Other than competiting systems, processing (such as fax and data demodulation) and storage is all done on commercially available hardware, as opposed to in dedicated hardware modules.

The rest of this section is a high-level summary of the features and characteristics of the proposed Zebra system. These will be based on the MMS requirements document.

A detailed Zebra feature list will be separately communicated.

2.3.2 Intercepts all types of communications

The Zebra system is designed to capture and store every call on every monitored carrier.

The system intercepts equally well TDM or IP traffic, from fixed, mobile or satellite networks. This interception functionality can be added modularly, for example, the system can be deployed initially to intercept only traffic from selected fixed international gateways, and then be expanded to include interception from other networks.

The Zebra system uses protocol analysis to determine the beginning and end of calls. All signalling information is extracted and stored together with the content of each intercept. When no protocol signalling is available VOX can be used to trigger recordings.

The hardware and software architecture of the system enables the operator to intercept all telecommunications activities that comply with the current ITU communication standards. This includes the communication intercepted at the international gateways, and at the external interfaces to the mobile networks.

Options are also included for monitoring Intelsat and Inmarsat communication.

The core business of VASTech is the monitoring of bulk communications, and VASTech shall endeavour to continuously update its products to provide solutions to the latest changes in the technological, communications and threat environments.

2.3.3 Latest technology and software centric, for integration

VASTech is using its own industry leading Zebra Mass Interception System with selected leading third party equipment to provide the MMS System. The VASTech Zebra is unique by using a VASTech gateway and commercially available severs and storage. It is software centric and uses the minimal vendor specific hardware (the gateway). As such, it can always use the latest commercially available hardware, leading to significant benefits to the customer, such as comparatively lower cost, higher supportability and increased functionality.

Zebra is currently the world leader in terms of this approach and density. VASTech intends to maintain this lead, and confirms to the CUSTOMER that it will continue to develop the product to ensure that the solution addresses the latest interception needs.

Such development will be based on market demands and is covered through the optional SOFTWARE MAINTENANCE AND UPGRADE for the specific functionality ordered. Additional or special development will be done on a case by case basis, against agreed specifications and pricing.

The underlying distributed network based architecture, and the use of the latest commercial servers and storage device, allows the system to provide a future growth path, and high levels of scalability and density.

The Zebra system has been developed to simplify the integration of the Zebra system to other applications that add intelligence value. These applications include the following:

- Analytical tools, such as speech processing, etc
- Existing customer applications
- Existing or competing interception systems, provided that these external systems also make an interface available.

2.3.4 Scalability and modularity

The system is highly scalable, with the main system components being the Zebra Capture Units and the Zebra Data Centres. Should budget or operational demands dictate, it is possible to start with a relatively small system to establish the infrastructure and refine operational procedures, and then to expand by adding the appropriate ZCU or ZDC.

Within each of these units, high scalability also exists. To add storage or interception capability is simply a matter of adding more additional commercial servers or storage devices. The software design allows the different functions, such as channel processing or storage management, to be deployed on the number of servers needed for the specific interception capacity. It is important to understand that there are no dedicated “channel processor” or “fax demodulation” servers.

Server blades are used for e.g. protocol analysis, recording control, signal processing, compression, data and fax demodulation.

2.3.5 Ideal for large system applications – advanced filtering and CIC mapping

2.3.5.1 Powerful SS7 CIC Mapping

2.3.5.1.1 Summary

The system has semi-automatic support for determining the point codes and circuit identification codes of SS7 bearer channels. This functionality has proven essential and reliable in existing large operational sites.

2.3.5.1.2 CIC Mapper

SS7 is a common channel signalling system. This means that signalling messages are sent in a set of common signalling channels, which may not be physically associated with the bearer channels for which they carry signalling. In any signalling channel one must expect signalling for bearer channels on more than one bearer channel carrier.

Signalling messages contain a Circuit Identification Code (CIC) that identifies the bearer channel to which the signalling refers. Unfortunately the CIC has only local significance between the pair of switches connected by the bearer channel and is not globally known. Any system that intercepts SS7 communication channels must therefore derive the CIC mapping between each pair of intercepted switches in order to make sense of the signalling it intercepts.

The classification of channels even in a system as small as 128 E1's is a daunting task.

The Zebra supports semi-automatic determination of the point codes and circuit identification codes of SS7 bearer channels (CIC mapping). CIC mapping is performed on all the connected SS7 carriers and the application provides the client with the CIC map of the connected E-1 carriers. Even if the SS7 signalling channel for a group of E1 carriers is present on an E1 carrier outside the group the system can still provide the CIC maps, provided that the carrier containing the signalling is also connected to the Zebra.

The system captures calls on SS7 streams by means of real-time analysis of signalling intercepted on signalling channels and capturing data on bearer channels. This process requires correct mappings of channel references occurring in SS7 signalling to intercepted bearer channels. The CIC Mapping functionality in Zebra system is responsible for creating and maintaining of these mappings.

When a new media gateway is introduced Zebra automatically creates the correct number of new, un-configured channels in the system configuration. The channel classifier grades each new channel as an SS7 signalling channel, SS7 bearer channel, SS5 channel, HDLC channel or unknown channel type. (In future releases the channel classifier will identify n x 64kbps HDLC channels, as well as VoIP on HDLC channels.)

The Zebra's CIC mapping utility tackles the SS7 bearer channels. It automatically derives the most likely CIC values of each channel from the intercepted signalling and bearer channels. In other words it correlates the observed signalling messages on the signalling channels with bearer channel activity.

The most likely mapping of channels and circuit identifier codes are graphically displayed. The administrator can choose between alternative mappings or suggest new ones. This is patently an indispensable tool for any SS7 application.

2.3.5.1.3 Interpreting CIC results

The following screen shot reflects typical CIC mapping results.

Figure 10 CIC Mapping

The two sides of a confirmed carrier are indicated in green.

- Red dots are for COT events which reflect absolute certainty.
- Blue dots are for DATA and indicate a good match.
- A yellow dot represents a high level of uncertainty.

Similar CIC patterns are visible directly above this identified carrier and one can therefore deduce that these two sides may be associated.

2.3.5.1.4 Administrative intervention

As CIC mapping is based on incomplete and ambiguous information it simply isn't possible under all operational conditions to infer CIC mappings that are absolutely correct. Administrators must therefore be enabled to modify and invoke CIC mappings when necessary.

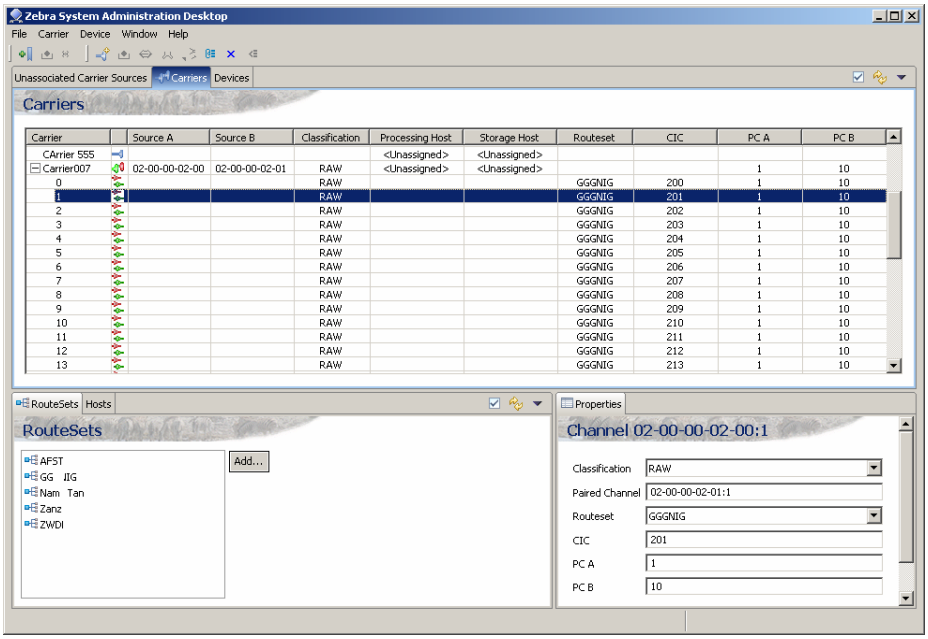


Figure 11 CIC administration

An administrator can confirm or alter mappings. Inferred mappings can be partially or completely applied to unmapped or currently mapped channels. Previously saved mappings can also be invoked on demand.

2.3.5.1.5 Point codes and CIC's

SS7 switches are identified by their point codes (PC). A point code is a number that uniquely identifies an SS7 switch within a specific numbering plan. International gateway switches have globally unique point codes specified by the International Telecommunications Union (ITU).

A bearer channel on a link between a pair of switches is uniquely identified by the pair of point codes of the switches and a CIC value. Every SS7 signalling messages has an originating point code (OPC), destination point code (DPC) and a CIC that identifies the bearer channel to which the signalling message applies.

Switches within a domestic network have point codes that are only required to be unique within the network. This means that (OPC, DPC, CIC)-triples may not be unique in an interception system if multiple networks are intercepted.

2.3.5.1.6 Route sets

When all the point codes of intercepted traffic in an interception system are unique, any bearer channel is uniquely identified by a (PC, PC, and CIC)-triple. But when multiple networks are intercepted and (PC, PC, CIC)-triplets overlap, we associate signalling channels with bearer channel groups in route sets.

A route set associates a set of signalling timeslots with a set of bearer channels. Routes between two pairs of SS7 switches, which have overlapping (PC, PC, CIC)-triples, are placed in separate route sets.

2.3.5.2 Advanced filtering and searches

The challenge of finding intelligence value in large interception database is addressed through the following:

- Powerful searches and filtering for known targets, including the use of wildcards. See also par. 2.3.9 on page 41.
- Optional analysis tools can be used to further provide searchable intelligence carrying content or suspect communications patterns. See par. 2.3.5.3 on page 34 for more information on analysis tools. Some of these tools, e.g. speaker identification, can optionally be combined in workstation search functionality.

User group filtering allows the administrator to set up specific filters to allow only selected groups of operators to access information related to specific targets. User tag fields are provided, to allow users to tag calls (e.g. “completed”, or “new target”). These user tags can be used in filters as a workflow mechanism, and allow statistics to be gathered per per operator or operator group.

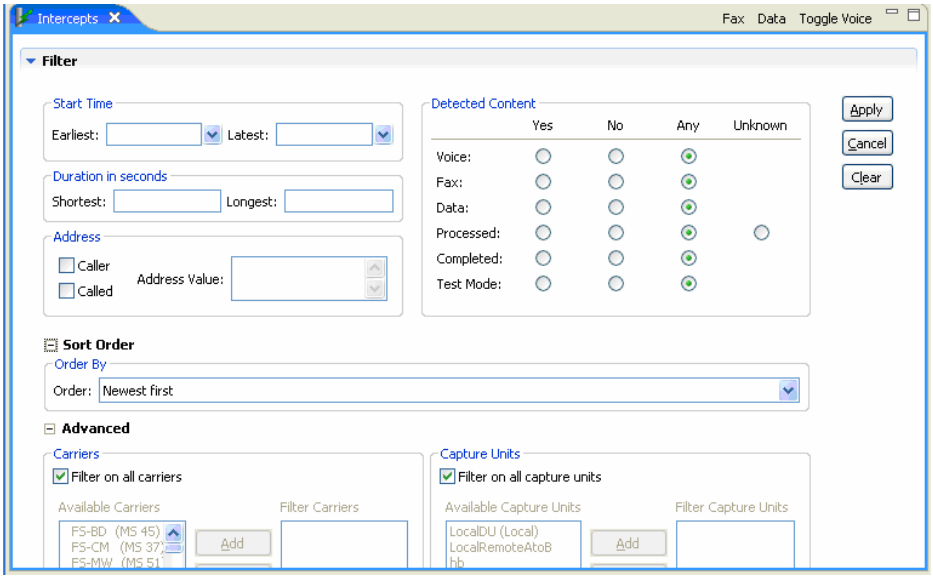


Figure 12: - Operator assigned filter

The operator can use existing filters as templates for new filters. Targets can be used as the basis of a filter by selecting one or more targets and using their addresses to create a filter.

2.3.5.3 Analytical tools

See par 2.4 on page 49.

2.3.6 Storage, compression and storage management

The Zebra system has an automatic storage manager that manages stored intercepts according to configured maximum ages. When an intercept reaches its maximum age it is automatically deleted by the storage manager to make space available for new intercepts. No manual storage management is required.

Storage management functions distribute the storage over the number of storage units available.

Storage options are described in par 2.2.3 on page 5.

2.3.7 Fax and data processing

2.3.7.1 Fax/data processing

Fax and data sessions are detected in monitored streams for which both directions are available. If both directions are available the system distinguishes between fax and data sessions. Only fax can be detected on monitored streams for which only one direction is available.

Modem demodulation and fax and internet protocol decoding are centralised in the Zebra capture unit. All data centres to which intercepts are migrated will receive demodulated and decoded files for fax/internet sessions. No further fax/data processing is needed in the Zebra data centres.

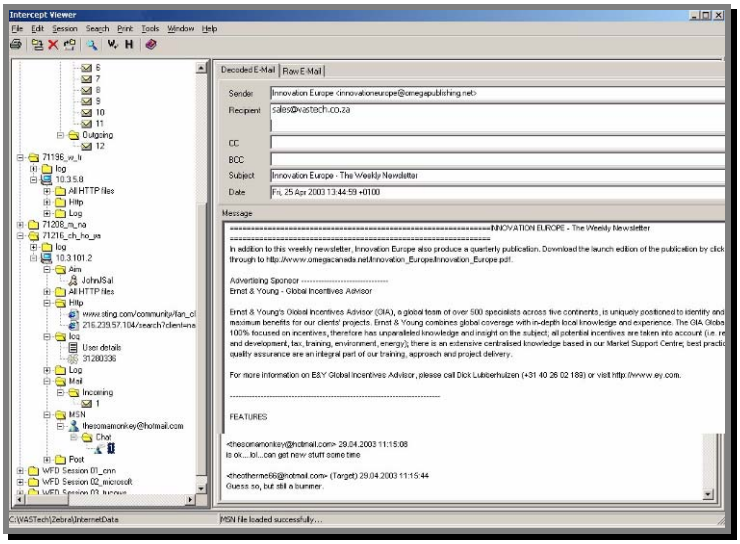


Figure 13 – Data

2.3.7.1.1 Fax protocols

The FAX demodulation software package processes facsimile files in accordance with the following ITU-T recommendations:

- V.34 (2400...33600 bit/sec)
- V.17 (7200, 9600, 12000, 14400 bit/sec)
- V.29 (4800, 7200, 9600 bit/sec)
- V.27ter (2400, 4800 bit/sec)
- V.21 (300 bit/sec)
- T.4, T.6 – black and white pages (*MH, MR, MMR*)
- ECM – error correction mode
- T.81, T.82, T.85 – color pages (*JPEG*, *JBIG*). (Optional).

2.3.7.1.2 Modem protocols

The MODEM demodulation software package processes facsimile files in accordance with the following ITU-T recommendations:

- V.90 (4800...33600 bit/sec, 28000...56000 bit/sec)
- V.34 (2400...33600 bit/sec)
- V.33 (12000, 14400 bit/sec)
- V.32 & V.32bis (2400, 4800, 7200, 9600, 12000, 14400 bit/sec)
- V.29 (4800, 7200, 9600 bit/sec)
- V.26bis (1200, 2400 bit/sec)
- V.26ter (2400 bit/sec)
- V.26A&B (2400 bit/sec)
- V.22 & V.22bis (600, 1200, 2400 bit/sec)
- V.21 (300 bit/sec)
- Error correction: MNP 2-4 / ITU-T V.42
- Data compression: MNP 5 / ITU-T V.42bis / V.44
- XModem, YModem, ZModem.

Data link:

- Error correction: MNP 204 / ITU-T V.42
- Data compression: MNP 5 / ITU-T V.42bis, V.44
- The following modem operational modes are supported:
- Rate renegotiation
- Retrain

- Protocol changing
- Automode

2.3.7.1.3 Conversion and decoding of protocols

Continually being reviewed and added, as below.

2.3.7.1.3.1 Data link

- Sync and transmission: PPP, SLIP, CSLIP, LCP, NCP, Van Jacobson, IPCP, CCP, MS PPC
- X modem, Y modem, Z modem

2.3.7.1.3.2 Transport

TCP, UDP (RTP/RTCP, UDPTL)

2.3.7.1.3.3 Network

Ipv4

2.3.7.1.3.4 Session

- HTTP: version 1.0, 1.1
- E-mail: SMTP, POP3, IMAP4
- Web mail over HTTP: Yahoo, Rambler, Yandex, etc
- Messengers: ICQ, MSN
- Chats: IRC
- File transfer: FTP
- Remote access: Telnet
- Multimedia: Videoconference (H.323); VoIP (H.323, G.723, G.729); FoIP (H.323, T.38)

2.3.7.2 Manual fax/modem demodulation

A facility is provided for the manual demodulation and decoding of fax and internet sessions. This is useful for recordings of fax/internet sessions that have been made in another system. The Zebra system will demodulate the submitted wave files containing the audio content and produced a zipped archive containing the decoded content of the wave file.

2.3.8 DCME Software

2.3.8.1 General

VASTech provides an integrated software solution for monitoring of DCME compressed traffic. Decompression is implemented in software on Zebra blade servers. The software automatically detects the type of DCME signals and decompresses all channels in real time. At this point it is processed as normal uncompressed E1 streams through the Zebra system to extract voice, fax and data calls.

The power of this approach lies in the flexibility to re-configure the system in minutes to address another type of DCME stream. Agencies can access different types of DCME communications without having to buy all models of commercial DCME terminals in use. This improves operational efficiencies and results in cost savings.

2.3.8.2 Software based DCME

The following drawing shows the high level architecture of our solution for the interception and processing of compressed DCME signals from satellite feeds. The system is a software-based DCME solution that is integrated with the Zebra capture units.

NB: This feature is under development and currently scheduled for release in Q3.

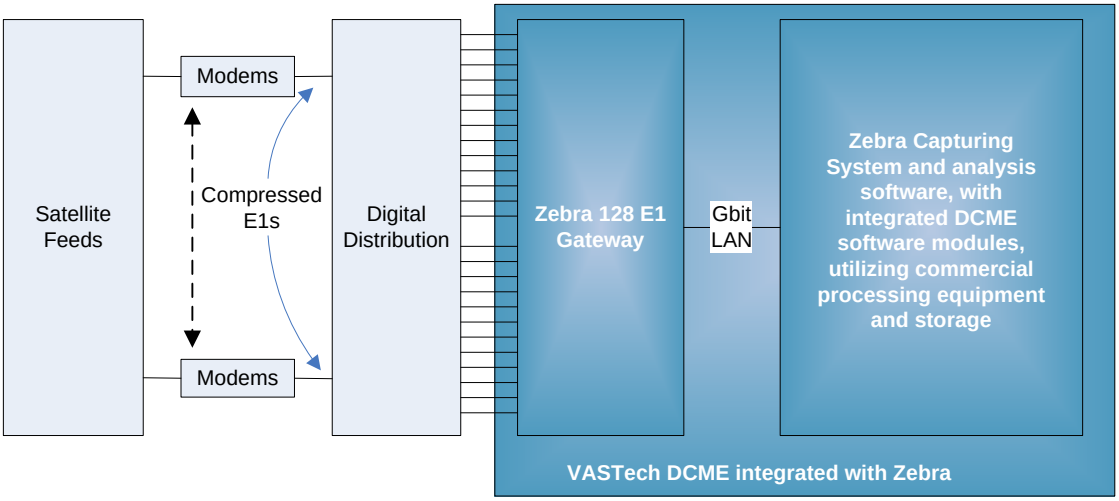


Fig 14: DCME solution

The software processes compressed DCME signals of connected E1 streams and decompresses the channel information contained within these signals.

This solution requires a Zebra PDH gateway to interface directly with the compressed DCME streams from the 2 Mb/s modem outputs. The VASTech gateway can accommodate up to 128 mono E1 connections. The software captures the E1 compressed DCME information on connected E1 streams from the media gateway and decompresses the channel information contained within the DCME compressed signal.

2.3.8.3 Supported terminals

The system supports the decompression of compressed signals from the following DCME terminals:

- Celtic 3G
- OKI TC 2000 (C5 or SS7 signaling)
- DTX 240 (D, E, F)
- DTX 360 (IESS 501 & LDCELP)
- Mitsubishi DX 3000
- Mitsubishi DX 7000 (TDM, G.768)
- DTX 600 (TDM, G.768)

This solution offers the following functionality:

- Decompresses all active channels from any compressed E1 stream
- Decodes the signalling channel and obtains the telephone number (provided the signaling information is available)
- Provides a duplex recording of all voice channels and their dialed numbers (provided the signaling information is available)
- Captures digitally transmitted faxes (fax compression mode) and outputs them as tiff files
- Demodulate all modulated fax and modem channels
- Classifies DCME compressed streams connected to the gateway
- Does not require training on DCME signals

NB: IP versions of DTX 600/Mitsubishi DX 7000 are not currently included. As soon as they have been implemented and tested, quotations will be provided to upgrade the system.

2.3.8.4 Comparison of Digital Circuit Multiplication Equipment

The following provides a comparison between the traditional DCME and our software based solution.

Factor	Standard DCME terminals	Soft DCME
Cost	**High:** Two DCME terminals required for every compressed duplex E1 per country or per satellite for the specific DCME type that must be	**Relatively low:** Software licence, blade server and optional storage may be needed. Software can be reconfigured to allow

	intercepted.	decompression of any of the supported DCMEs without the need to buy any more terminals.
Manpower skills and training	**High:** training must be provided for the configuration and maintenance of each DCME terminal type.	**Low:** training only required for the software application.
Acquisition	**Difficult**: older DCMEs have been discontinued. It becomes increasingly difficult to source the terminals, and limited warranties are provided.	**Easy:** older DCMEs are included.
Maintenance	**Difficult and expensive:** numerous hardware modules must be kept for spares.	**Simple and less expensive:** a spare gateway if you insist. All other equipment is directly available from Dell.
System complexity	**High**: various hardware modules (e.g. switching matrices, DCME terminals, capturing system, etc.) must be integrated.	**Low:** no switching matrix is required. The DCME interface is via the existing Zebra gateway.
Intelligence value	**Low, if measured within a system that utilizes a switch matrix:** only targeted channels are recorded.	**High**: Zebra simply records all traffic on the lines to which it is connected. Filtering is applied to extract recordings of interest.

The implementation of software based DCME provide cost effective content extraction of carriers and improves operational efficiencies due to flexibility of the solution.

2.3.9 Zebra User Workstation (ZEUS)

The Zebra User Station (ZEUS) is a completely new implementation aimed at improving intelligence gathering.

Authorized operators can play back intercepted calls, or view faxes and data sessions from the remote sites. Operators with the appropriate rights can also export specific calls to network folders, or the archiving server, or to folders on their own machines. The exported files can be written to CD, or to archiving media. In the case where faxes have not been modulated successfully, the associated wave files can be exported to the Fax Grooming Station for more advanced decoding capabilities. In addition, operators can tag calls for further processing by specialist operators, or to form part of a specific case.

The search engine has been designed to search for historical data and content in large databases without compromising productivity.

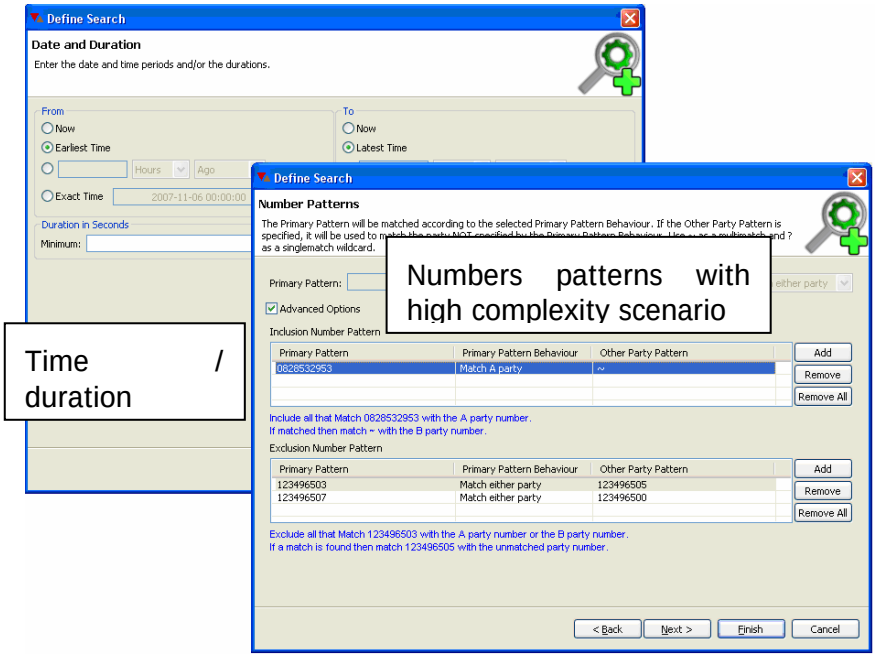
With Zebra Version 3, searches based on a variety of search parameters, are conducted in the background. This allows the operator to continue with other tasks while the searches are being conducted.

Typical search engines often affect the computer performance and also tie the user to the system, where the user needs to wait until it gets a result.

As shown in the subsequent graphics, search criteria include the following:

- Number patterns with wildcards
- Time and duration
- Type of intercept
- Intercept Status (e.g. faxes demodulated)
- Carrier Information (e.g. from country X to country Y)

Zebra Deployment Unit (e.g. from Zebra System "Z" running in another city/location)



The ZEUS has the following functionality:

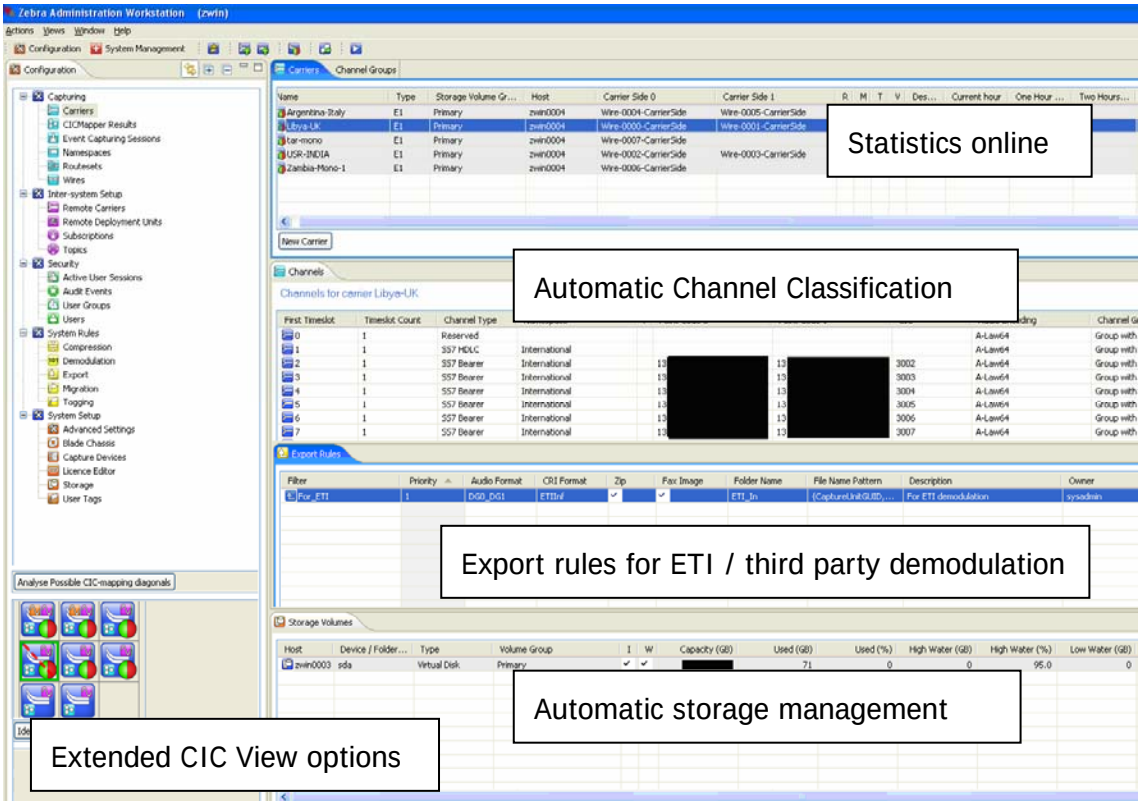
- Secure login
- Security filters configured by the system administrator determine which intercepts are visible to the logged in user. Security filters currently operate on telephone numbers.
- Display call related information, including called and calling party numbers (when available in signalling), call start time, call duration, content type (speech, fax, data), fax/data successfully/unsuccessfully demodulated, carrier on which intercept was made.
- Filtering on telephone numbers, carriers, data/time
- Play audio content, including calls that are still recording.
- View fax images.
- View content of internet sessions.
- Export intercepts.

2.3.10 Zebra Administrator Workstation

2.3.10.1 General

A number of features have been added to the Zebra Administrator Workstation (AWS) to simplify installation and support work, as well as the operation of complex large and distributed systems. These features include the following:

- Automatic storage management, allowing the customer to manage and share the storage in large Zebra storage systems.
- Improved automatic CIC Mapper (SS7) with different display options to allow CIC mapping of large systems (more than 1000 bi-directional E1s).
- Export anytime statistic from each window to csv, htm, pdf and xls file formats.
- Online statistics.
- Automatic export rules to external applications and folders, such as used by ETI.
- User administration
- Configuration of system components and monitoring configuration.
- Live audio monitoring of timeslots for signal analysis purposes.
- System health monitoring
- System audit trail.



2.3.10.2 Security

2.3.10.2.1 Hierarchical groups

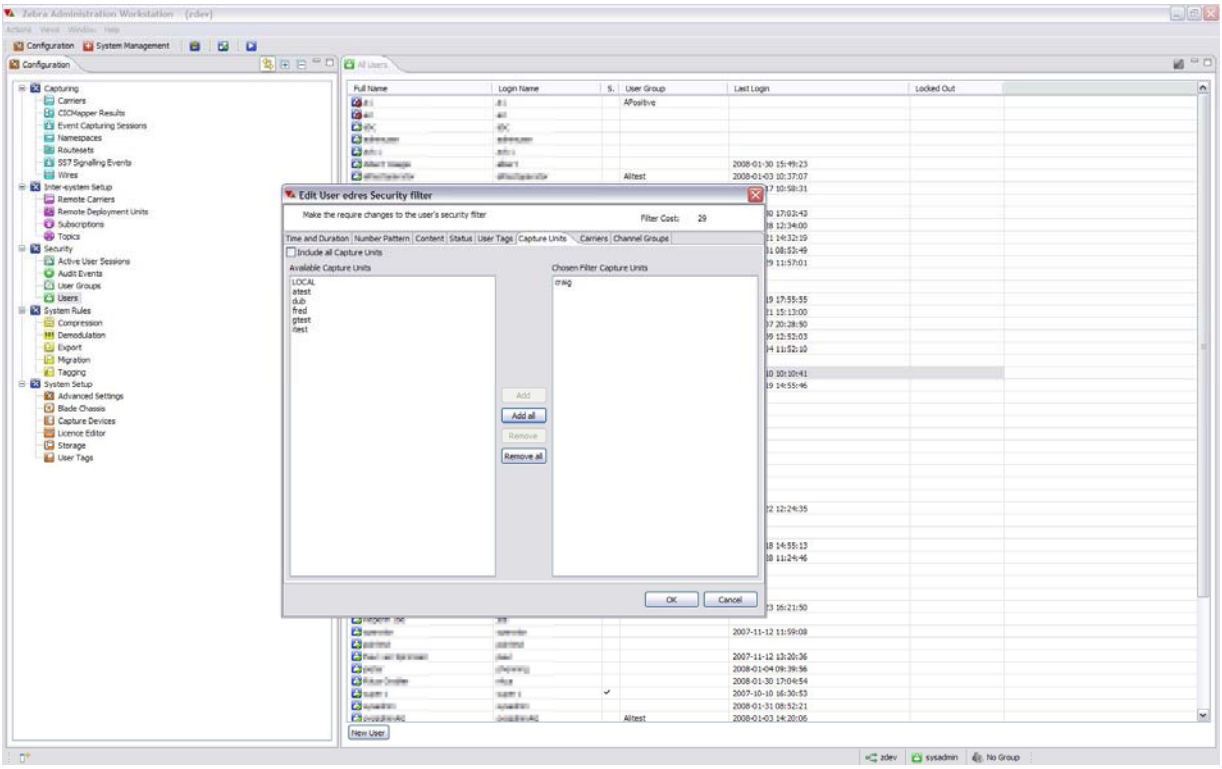
Zeus defines three user roles – administrators, supervisors and operators.

- Administrators manage all aspects relating to users and targets. They create and modify security fences assigned to users.
- Supervisors have some administrative capabilities defined by a security fence as imposed by the system administrator. A supervisor can create additional filters to assign a “case” or set of “cases” to an operator for example.
- Operators process the information presented to them.

2.3.10.2.2 Secure login

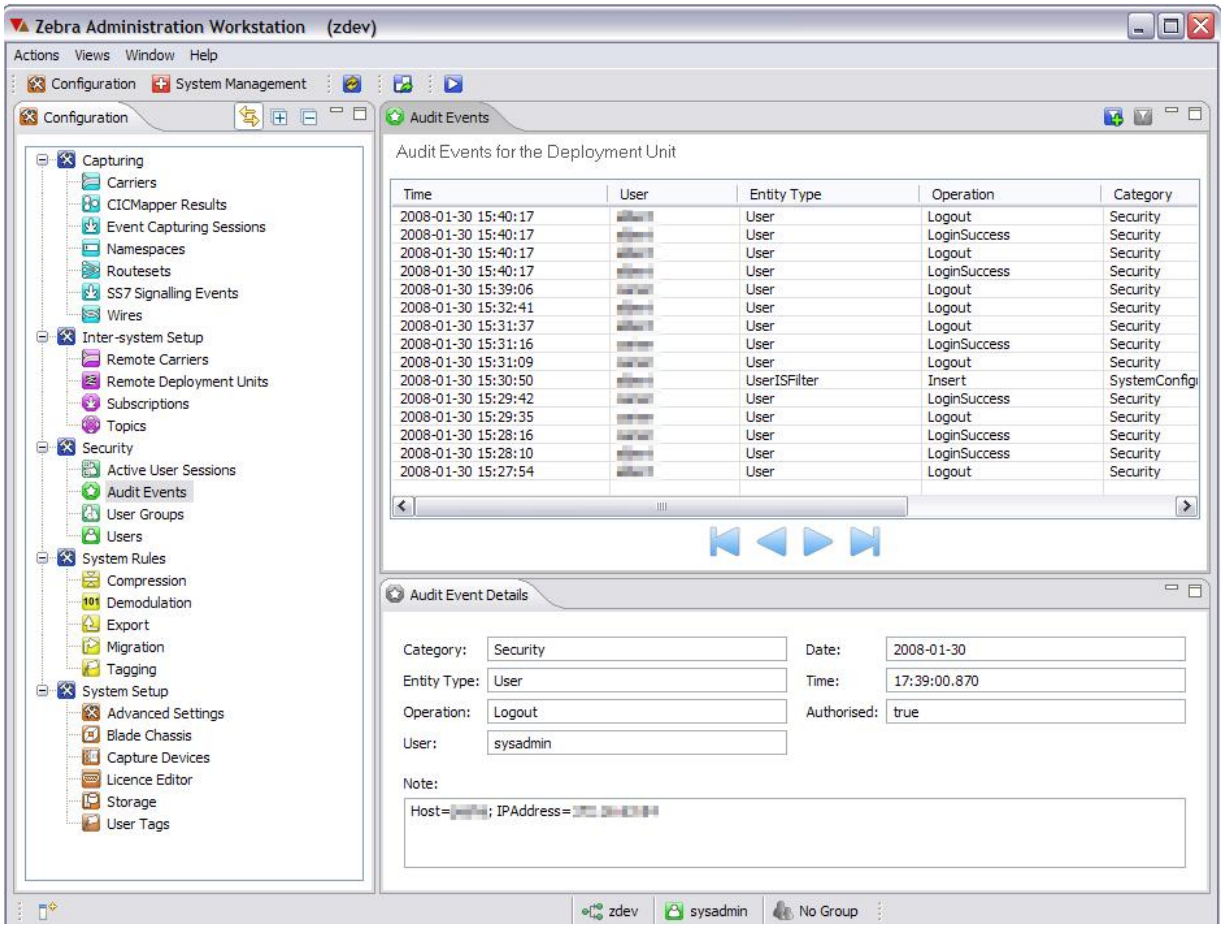
The configuration and intercepts stored in the Zebra system are only accessible to authorised users of the Zebra system. An operator must log into the system to gain access. The Zebra authenticates the user. His password is never transmitted over a clear channel.

The following are some screenshots of security related features:



Security filters can be set up to allow specific users certain permissions, based on parameters related to the following:

- Time and duration of the call
- Specific numbers or number patterns
- Types of content, e.g. faxes only
- Status of calls
- User tags
- Capture units
- Carriers
- Channel groups.



Audit events are logged for each user.

Lock-out of accounts occur if wrong passwords have been submitted an administrator selectable number of instances.

2.3.10.3 Live audio

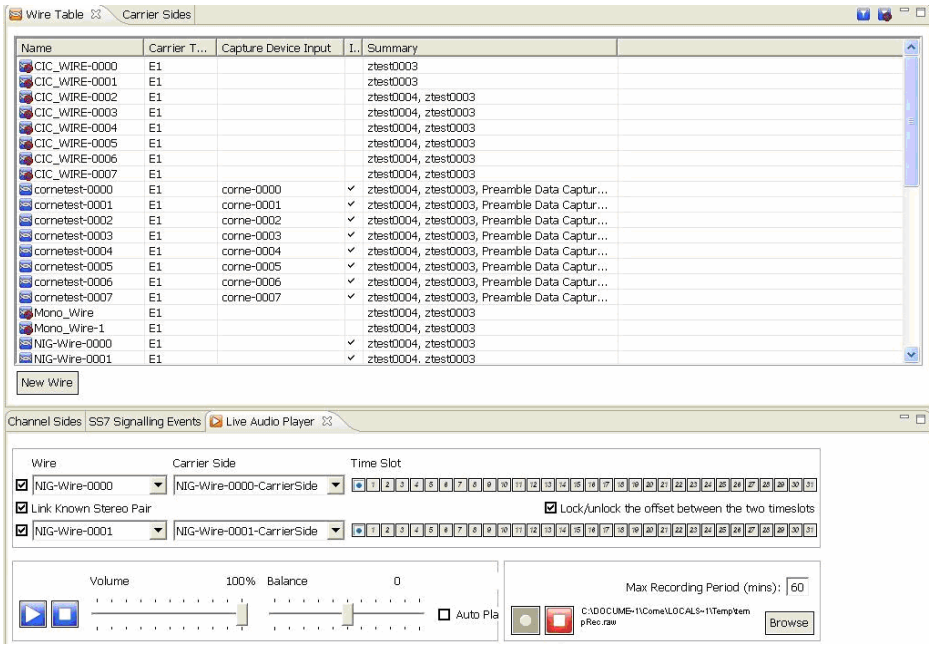


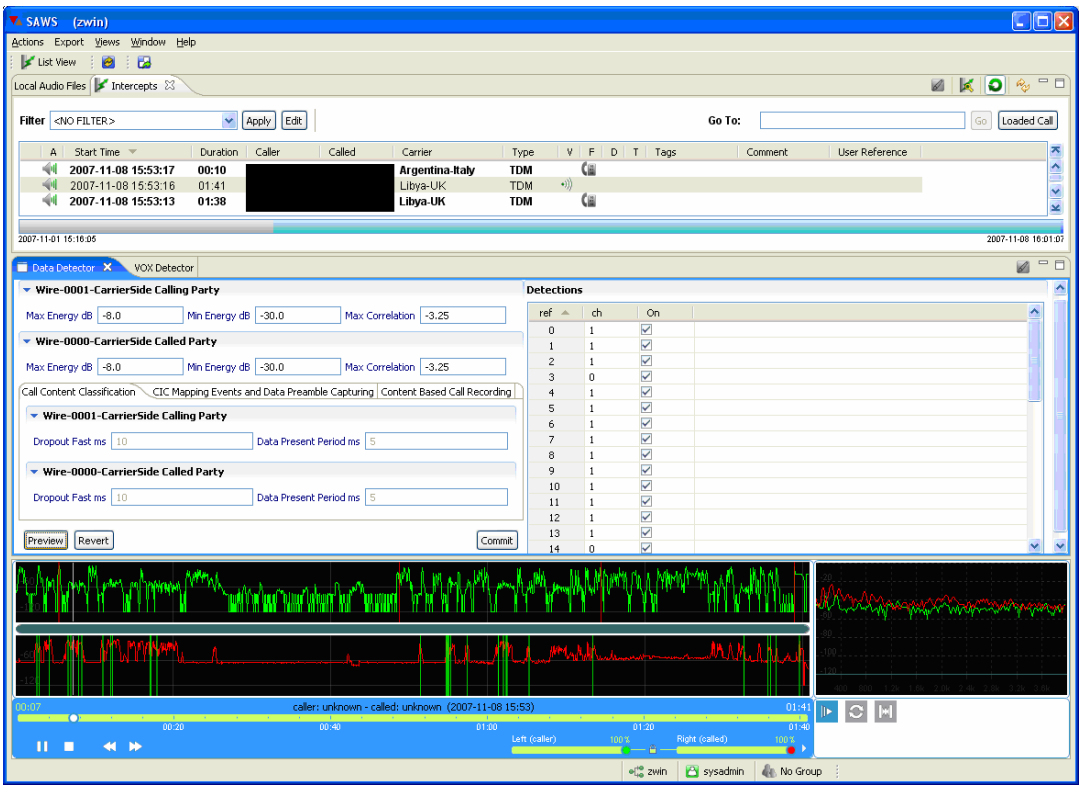
Figure 15 – Audio playback of live timeslots

Administrators can play the live audio from one or two channels (timeslots), and also record selected channels. This feature is useful when checking signalling and verifying CIC maps.

2.3.11 Zebra Signalling Analysis Workstation

A Signaling Analysis Workstation capability has been added to Zebra, to provide administrators and signal analysts the ability to:

- Analyze signals from local audio files.
- Analyze signals from recorded calls.
- Play and record live audio.
- Customize various content detectors to improve the detection accuracy of the different detectors.



2.4 Speech processing and analytical tools

2.4.1 General

The Zebra System has been developed to for integration with the specific speech processing and analytical tools *as selected* by the CUSTOMER. These tools have not been included in this SPECIFICATION, however, provision has been made for the inclusion of such tools in the OFFER.

This feature enables the CUSTOMER to select the specific tool most appropriate to its specific requirements and conditions, e.g. language. Tool selection will be done in conjunction with the CUSTOMER, based on detailed requirements.

The selected tool will determine how many additional servers and rack infrastructure will be required per ZCU. These servers will be connected to the content storage of each ZCU via the ZCU internal LAN.

2.4.2 Included

2.4.2.1 Meta data / Network analysis

Figure 16 on page 49 shows an example of a network view of target communications. By clicking on the link between the target and another party, all communication between the two parties is shown in the window below the diagram. Clicking on one of the intercepted sessions between the parties allow the operator to listen to the call or to view related faxes or data sessions.

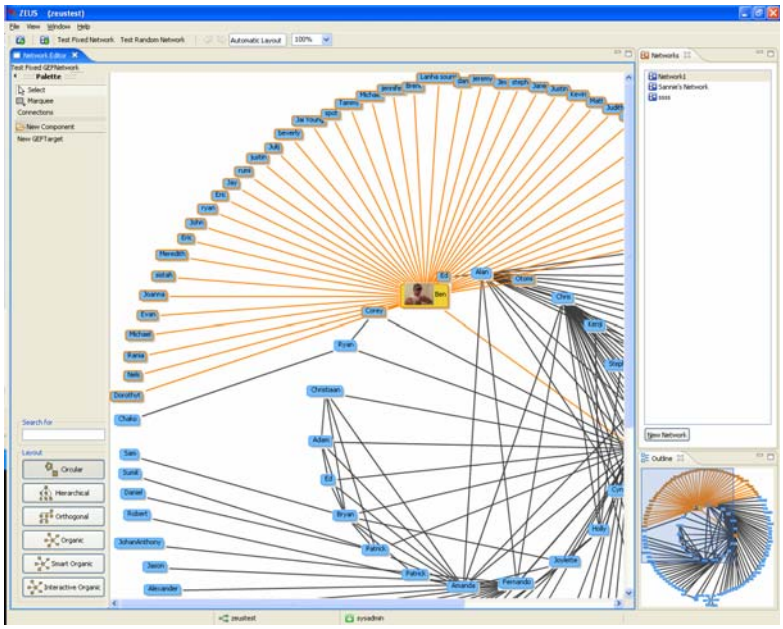


Figure 16: Network view of target and first contacts

2.4.2.2 To be selected in consultation with CUSTOMER

The following additional analytical tools need to be selected in consultation with the CUSTOMER:

- Free text search
- Language Identification
- Gender Identification
- OCR
- Speaker Identification
- Word spotting
- Automatic translation (voice, fax, text, web site)

After consultation with the CUSTOMER, such tools will be integrated into Zebra at cost plus a fixed percentage, as stated in the OFFER.

2.5 Uninterruptible Power Supply (UPS)

VASTech will provide a UPS power with capacity of 1 hour for the MMS system. The actual power capacity is dependant on the specific storage options selected.

Note however, with reference to satellite sites B1 and B2:

- UPS power for satellite antenna arrays are excluded and optionally available
- UPS power for processing equipment is provided for 30 minutes

Approximate specifications are as follows:

Option 1 (2 month storage of all intercepts)

MGE Galaxy PW 200kVa met 0.8 power factor (160kW).

Unit	Size	Weight
MGE Galaxy PW UPS	1.9m high; 1.0m deep; 1.2, wide	
Batteries for 60min	1.6m high; 1.0m deep; 5.5m wide	8 ton

Option 2 (one year storage all intercepts)

MGE Galaxy 6000 400kVa met 0.8 power factor (320kW).

Unit	Size	Weight
MGE Galaxy 6000 UPS	1.9m high; 1.0m deep; 3.6, wide	
Batteries for 8min		
Batteries for 60min	1.6m high; 1.0m deep; 10.0m wide	15 ton

The CUSTOMER must provide reliable power to the air-conditioning system.

2.6 Operator stations

Operator stations will be multimedia stations that include the following:

- CD archiving
- Digital wave file “correction” capability

See also Statement of Compliance.

3 LOGISTIC SUPPORT

3.1 Documentation

The ZEUS (Zebra User Station) operator manuals will be provided in Arabic. Administrator and other operator manuals will be provided in English. These can optionally be translated in Arabic, as discussed in the OFFER.

One operator manual will be provided in hardcopy, per ZEUS operator station as well as software copy.

3.2 Spares and spares holding

Provision has been made in the OFFER for the essential on-site spares holding.

3.3 Warranty

The system performance is warranted for three years, as described in the OFFER.

3.4 Supportability, MTBF

The MTBF of VASTech Gateways shall be better than 20 000 hours.

The system is modular and uses commercially available servers and storage units, allowing it to be highly supportable from a hardware perspective. Software warranty conditions are described in the OFFER.

4 PROFESSIONAL SERVICES

4.1 General

The scope of Professional Services is described in detail in the OFFER and is listed here for completeness only:

- System engineering
- Project management
- Site inspection and preparation
- Development services
- Installation and commissioning
- Training, including the following:
    - Installation training, to enable the CUSTOMER to execute installation and configuration at remote sites
    - Operator training
    - Administrator training
    - Support training.

5 ACCEPTANCE TESTS

The following types of Acceptance Tests will be conducted:

- Factory Acceptance Tests
- Preliminary System Acceptance Tests
- Final System Acceptance Tests.

These tests are described in detail in the OFFER.

APPENDIX A: Trade-offs and design options

1 INTRODUCTION

This appendix contains a number of options that were considered in this SPECIFICATION.

2 SYSTEM ARCHITECTURAL OPTIONS

See Figure 1 on page 4. The Central Site C1 must be connected to the different interception locations. The following options were considered:

2.1 Option evaluation and selection

2.1.1 Option 1: Zebra Capture Unit(s) at locations

2.1.1.1 Description

Install a complete Zebra Capture Unit at each of the remote intercept locations. Store the content and IRI at the remote locations. Transfer only the content of interest, e.g. the content that is being played back, to the Central Site.

2.1.1.2 Evaluation

The benefit of this option is that comparatively low bandwidths are required between the different locations. The disadvantages of this option include security and support at remote sites; physical space requirements at remote sites; coordination of large UPS requirements.

This option was not investigated further.

2.1.2 Option 2: STM-1/4 links from remote sites

2.1.2.1 Description

According to this option, all the traffic that needs to be intercepted must be transferred from the remote sites to the Central Site. Interception takes place only at the Central Site. This option will require the equivalent bandwidth of STM-4s as is on the remote sites.

2.1.2.2 Evaluation

The advantage of this option is that all interception is centralized. However, the complexity and costs of multiplexing (etc) and managing the different E1s, STM1s and STM4s argues against this option.

This option was not investigated further.

2.1.3 Option 3: Zebra Gateway at remote locations – Preferred option

2.1.3.1 Description

In the case of the International Gateways, (Sites A1, A2 and A3), install only Zebra Gateways and buffering equipment at the remote locations. Transfer all the intercepted traffic via dark fibre from the remote sites to the Central Site.

In the case of the Satellite Interception points, the same approach will be used.

2.1.3.2 Evaluation

The advantage of this option is that Ethernet traffic, rather than telecommunications traffic is transferred. This has a lower cost and complexity involved, and has been done before by VASTech on similar sites. The disadvantage is that it is required that a small UPS needs to be installed at the remote sites.

This option is the preferred option and has been used in the rest of this document.

3 ALTERNATIVE COUPLING AT SITE A1

The approach shown in Figure 3 on page 9 is used for coupling on Sites A1 to A3. Figure 17, below, shows an alternative approach.

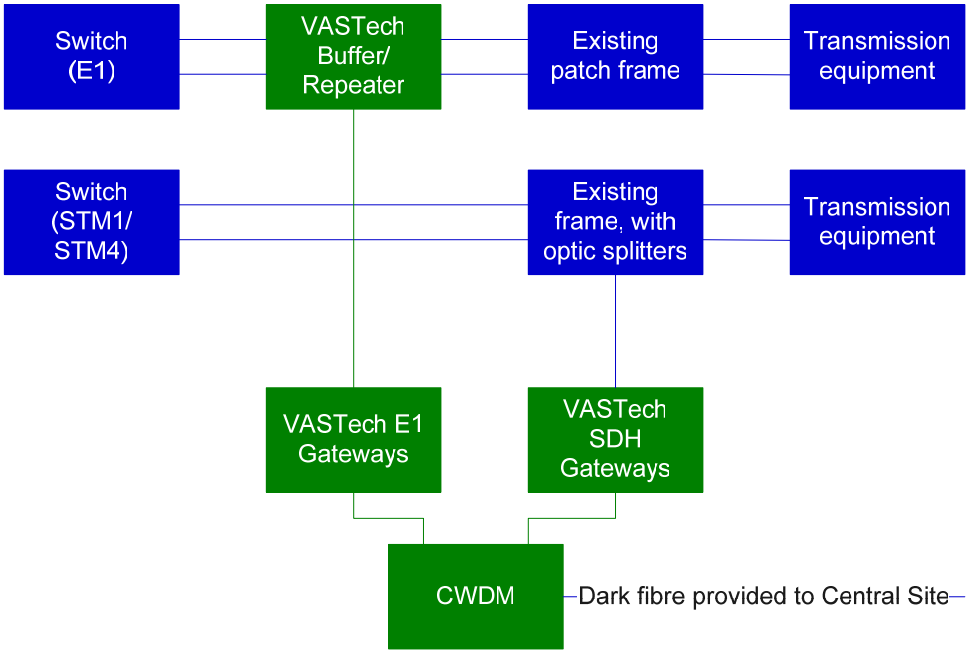


Figure 17: Alternative coupling Site A1

Option 2: Directly through VASTech Buffer-Repeater

The E1 lines, normally going into the existing patch frame, is connected into the VASTech High Impedance (Hi-Z) Buffer-Repeater, from where it is connected to the existing patch frame. The E1 lines are thus connected straight through between the switch and the existing patch frame. Using this option, the following benefits accrue:

- The VASTech Gateways do not have to be located in the same room. (Distance to be advised)
- The VASTech Buffer-Repeaters provides two buffered outputs. One of these outputs are connected to the VASTech Gateways, while another one is available for the later use by another application or agency.

However:

- Existing telecommunications cables may need to be modified.
- Boundaries of responsibility is less clear: although in operation elsewhere, this requires an in-line installation of another product.

APPENDIX B: DCMEs supported

The Soft DCMEs in the following table are supported in this version of Zebra. (Note that the yellow highlighted functionality is not currently supported).

DCME Terminals	Digital Fax	Codec	Dual Pool Bearer	Compress SS7	SS5	Ip Mode	Pre-assign	Control channel
OKI TC 2000	No	OKI	No	No	Yes	No	Yes	No
CELTIC 3G	No	G 726	Yes	No	Yes	No	Yes	No
DTX 240 (D,E,F)	Yes	G 726	Yes	No	Yes	No	Yes	No
DTX 360 (IESS 501)	Yes	G 726	Yes	No	Yes	No	Yes	Yes
DTX 360 (LD-CELP)	Yes	G 728 (LD-CELP)	Yes	No	Yes	No	Yes	Yes
DTX 600	Yes	G 729 CS-ACELP	Yes	Yes	Yes	Yes	Yes	Yes
DX 3000	Yes	OKI	Yes	No	Yes	No	Yes	Yes
DX 7000 (TDM)		CS-ACELP						
DX 7000 (IP)	Yes	M-CELP	Yes	Yes	Yes	Yes	Yes	Yes