



THE INVISIBLE POWER BEHIND YOUR CONNECTIVITY

Satellite Communications and Disaster Management

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**DISASTER MANAGEMENT INSTITUTE
OF SOUTHERN AFRICA**

WESTERN CAPE REGION



AGENDA

- Introduction
- Overview of Satellite communication
 - GEO, LEO etc.
 - Fixed
 - Mobile
 - Comparison with terrestrial based communication infrastructure
 - Combining the Technologies
- Western Cape Disaster Management Project
 - Overview
 - Location of Sites
 - Solution
 - Costs
- Questions



Overview of Satellite Communication

- Types of Satellites
 - LEO
 - Low Earth Orbit (90 minutes to a few hours)
 - Lower latency (a few hundred kms above the earth)
 - Continuous comms requires handover from satellite to satellite
 - MEO
 - Medium Earth Orbit (2 hrs to 24hrs)
 - A few hundred kms to a few thousand kms above the earth
 - Continuous comms requires handovers like LEO satellites
 - GEO – Geostationary Earth Orbit
 - Stationary relative to earth (i.e. 24 hr orbit)
 - 35000km – causes higher latency
 - Simpler antennas



A Few Examples of Satellite Terminals

- Fixed



- Mobile

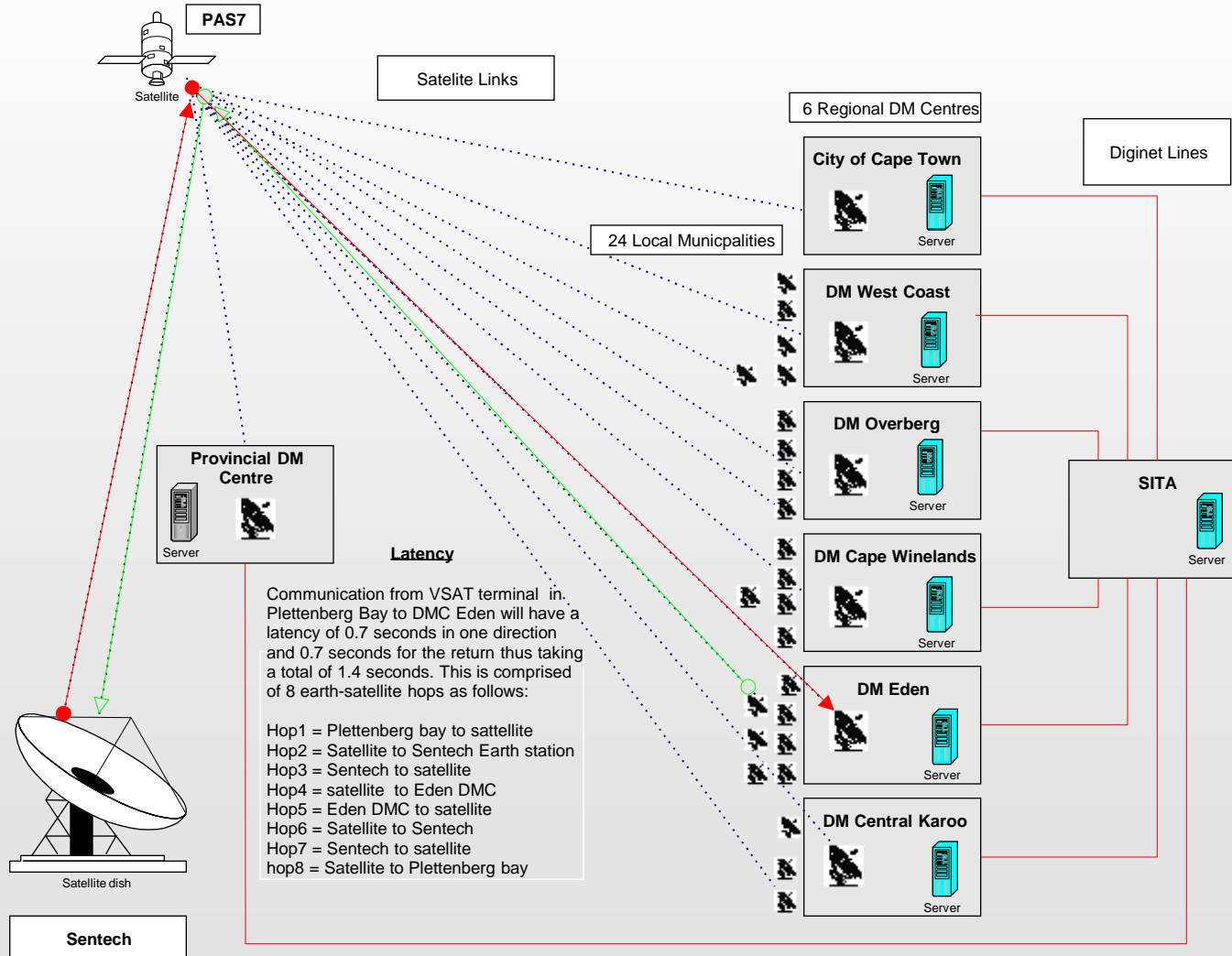


Comparing Satellite with Terrestrial based Communications

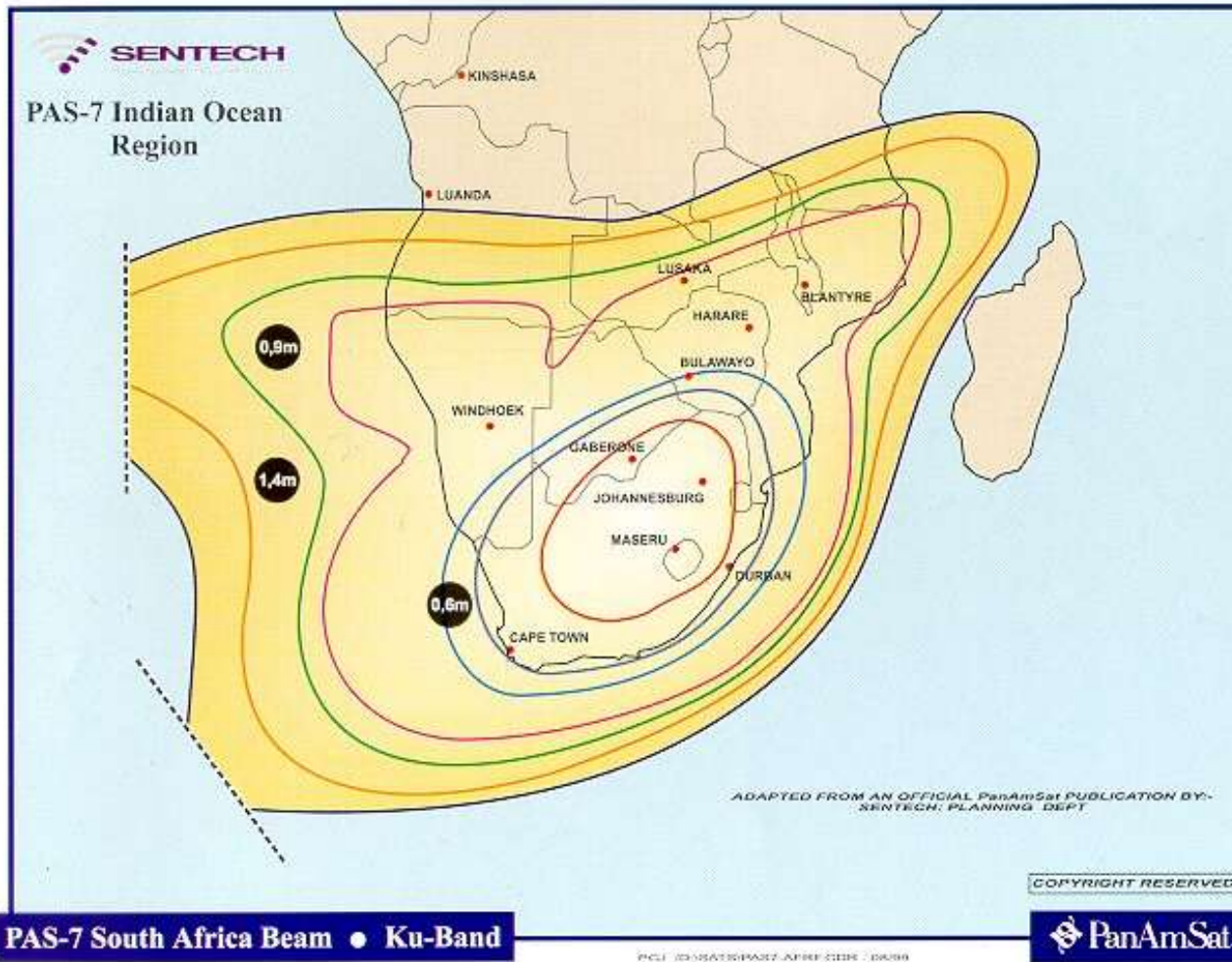
- Latency - higher on satellite
 - time data takes to travel e.g. seconds
- Speed/Bandwidth - similar
 - amount of data that can be transferred in a certain time e.g. 256kb/s
- Coverage – large area – no cables
- Cost – depending on situation can be cheaper



Latency between VSTAR terminals



Sentech Satellite Coverage



Satellite communication and Disaster Management

- Ideal for disaster management – infrastructure less vulnerable
- Dynamic allocation of bandwidth – make bandwidth available where needed most i.e. area of a disaster
- Can purchase additional bandwidth without changing equipment
- Option for mobile unit (portable and fully mobile)
- Can be deployed anywhere in SA where there is a clear view of the sky
- Fast set up time
- Ability to transmit same data to all sites simultaneously (broadcast)
- Saturation of public networks e.g. London Bombing – 500 000 calls made via telkom in first hour, Argus etc.



Comparison with Terrestrial based Communications

- Resilience
 - Satellites not susceptible to flooding, earthquakes etc.
- Uptime
 - Generally speaking, satellite communications have good uptime
- Factors affecting
 - Solar Fade
 - Weather



Thailand Working Group on Satellite Communication Applications

After the Tsunami-2004:

Satellite communications for disaster management

The earthquake and tsunami of 26 December 2004 reminded the world of the necessity for establishment of technical supporting systems for disaster early warning, management and emergency communications for effective preparation for and response to major natural disasters. In this process, appropriate use of information, communication and space technical tools will help increase their cost-efficiency. Satcom can, and does, play a role in transmitting information from monitoring sites to information processing centers; networking such centers to form multi-hazard disaster management warning systems and management systems; and delivering alerts to the public; and providing crucial communication supports to disaster response actions.

Recent offers, and additional possibilities, for regional cooperation in satellite communications will be discussed. They include deployable satcom-enhanced broadband disaster response communications systems.....

NATIONAL SYSTEM FOR DISASTER MANAGEMENT



**INDIA - UNITED STATES CONFERENCE
ON SPACE SCIENCE, APPLICATIONS AND COMMERCE**
- Strengthening and Expanding Cooperation

SPACE RESOURCES, OPERATIONAL SERVICES AND FUTURE PLANS

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ABSTRACT

Considering the vast potentials of Space technology to provide critical services towards disaster management, Indian Space Research Organisation (ISRO) has been pursuing concerted efforts for appropriate technology development. ISRO with a well-knit space infrastructure comprising of INSAT and IRS series of satellites, is uniquely placed to provide services related to Disaster watch, Warning dissemination, Data collection, Monitoring and damage assessment, Vulnerability mapping, Communication support etc. A synergistic use of IRS and INSAT capabilities is planned to address several critical issues related to disaster management in the country.

Satellite Communications

"Satellites provide a unique and autonomous means of quickly establishing reliable high quality communications in a disaster stricken area anywhere in the world."

Applications of Imaging Satellites for Disaster Management

Disaster	Prevention	Preparedness (Warning)	Relief
Earthquakes	Mapping geological lineaments land use	<u>Geodynamic measurements of strain accumulation</u>	<i>Locate stricken areas, map damage</i>
Volcanic eruptions	Topographi and land use maps	<u>Detection/measurement of gaseous emissions</u>	Mapping lava flows, <i>ashfalls</i> and lahars, <i>map damage</i>
Landslides	Topographic and land use maps	<u>Rainfall, slope stability</u>	<i>Mapping slide area</i>
Flash floods	Land use maps	<u>Local rainfall measurements</u>	<i>Map flood damage</i>
Major floods	Flood plain maps; land use maps	<u>Regional rainfall; evapotranspiration</u>	Map extent of floods
Storm surge	Land use and land cover maps	Sea state; <u>ocean surface wind velocities</u>	<i>Map extent of damage</i>
Hurricanes		<u>Synoptic weather forecasts</u>	<i>Map extent of damage</i>
Tornadoes		<u>Nowcasts; local weather</u> <u>Local weather observations</u>	<i>Map amount, extent of damage</i>
Drought		<u>Long ranged climate models</u>	Monitoring vegetative biomass;

Normal -Operational or needs very little research

Underlined -Research and development required

Bold -Requires improved observation capability

Italics -Requires improved spatial or temporal resolution

Combining Technologies

- For a truly robust communications solution use all options
 - PSTN (e.g. Telkom landlines)
 - Cellular (Vodacom, MTN, Cell C etc.)
 - Two-Way Radios (e.g. Tetra)
 - Satellite (Communications and Imaging)
 - Microwave Radio Links (Wireless)



Western Cape DM Project

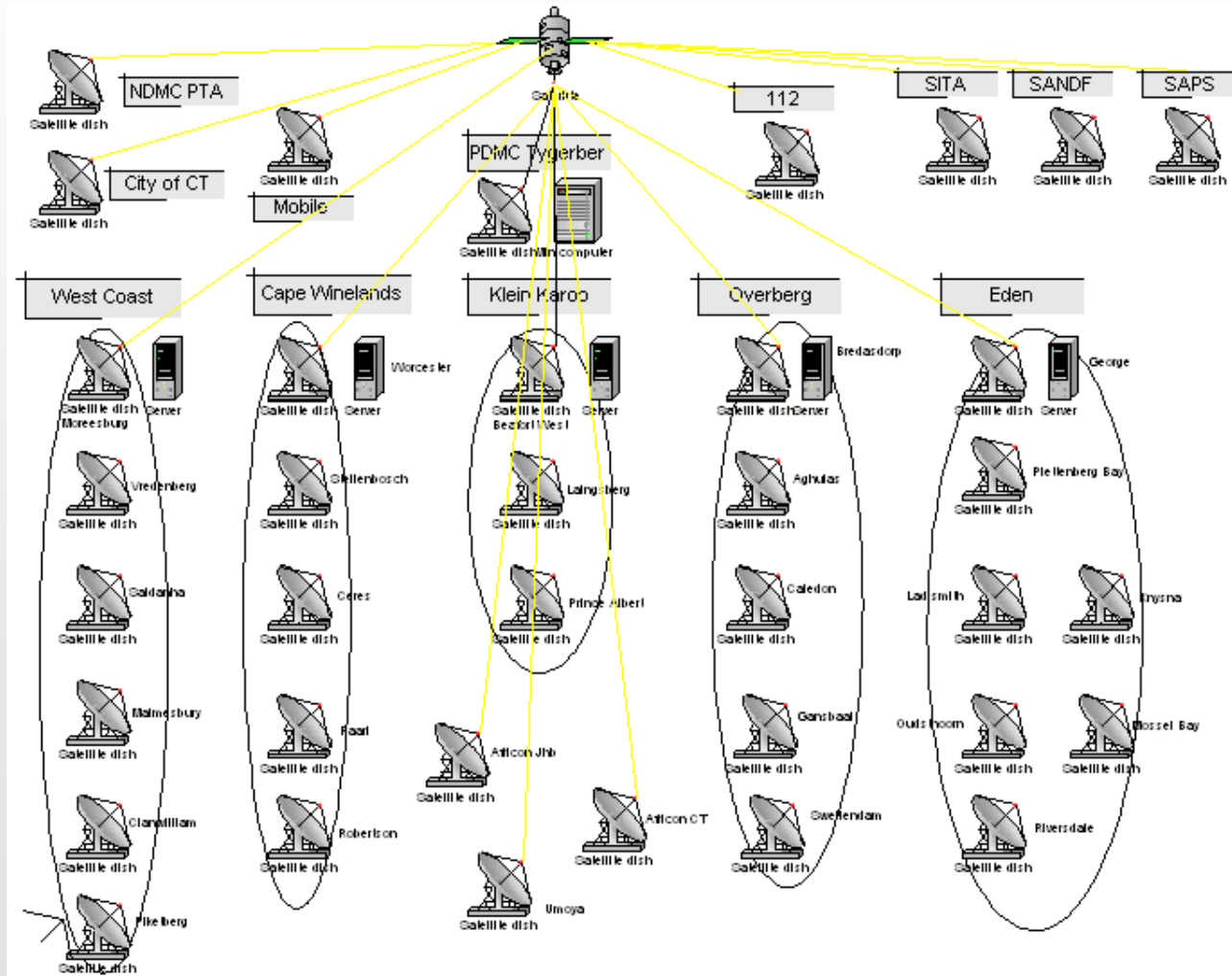
- 35 fixed Satellite links + 1 Mobile
- Radio links
- Mirror Servers
- GEMC³ Software
- Oracle
- Red Hat Linux
- VoIP solution
- Network Monitoring Centre



Africon Jhb   NDMC PTA

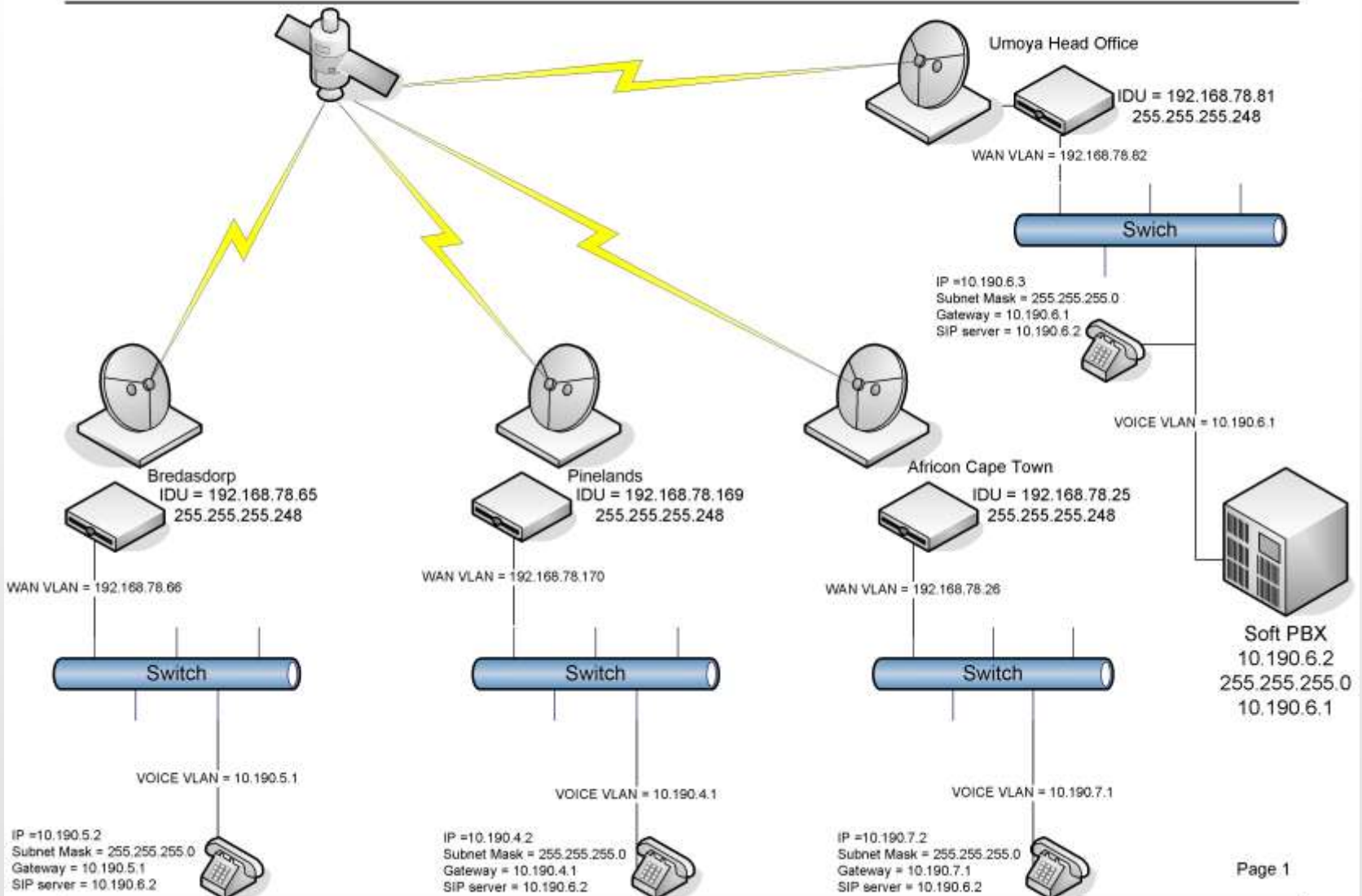


Connectivity



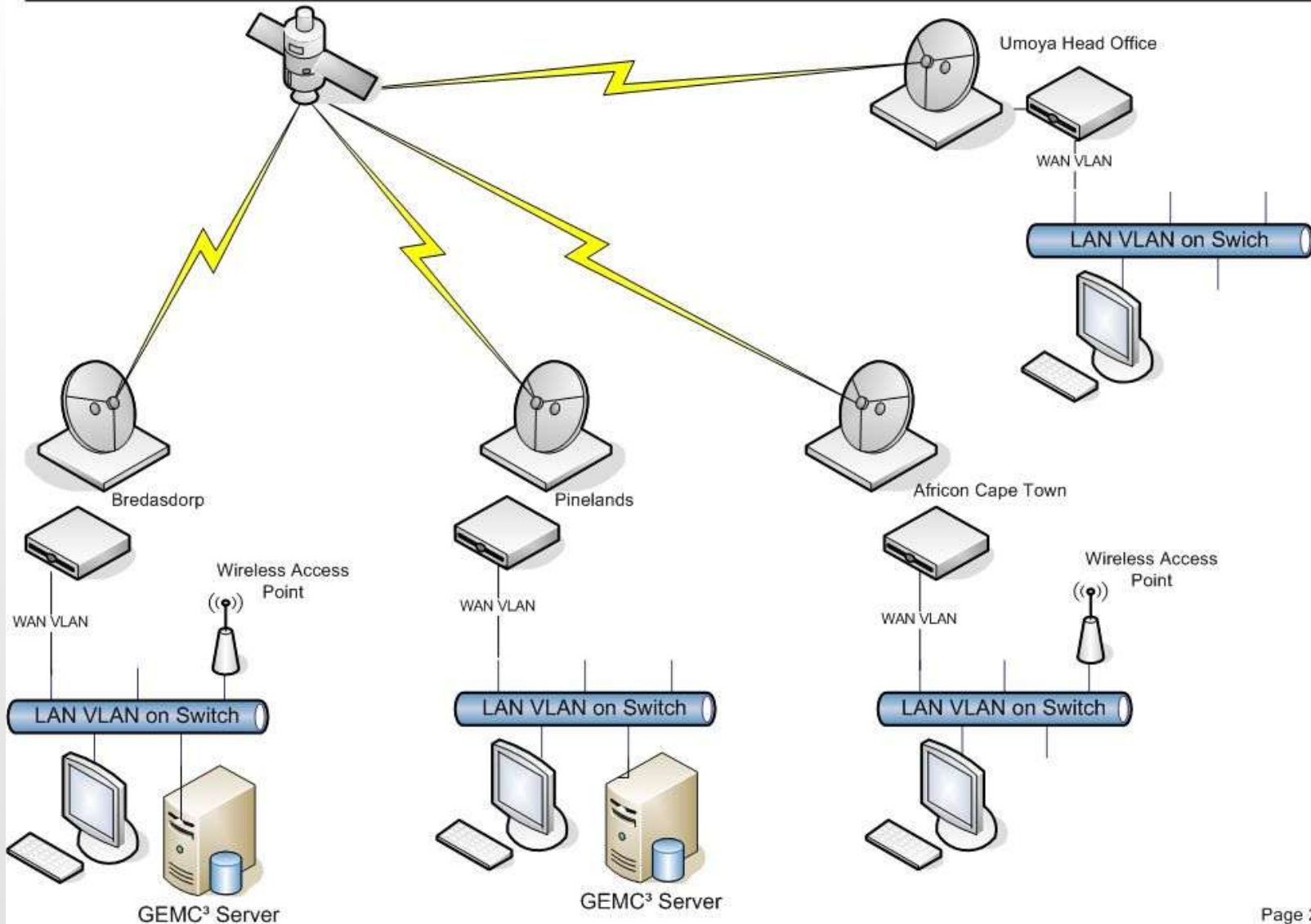
Voice Network Setup Plan

Tuesday, July 26, 2005

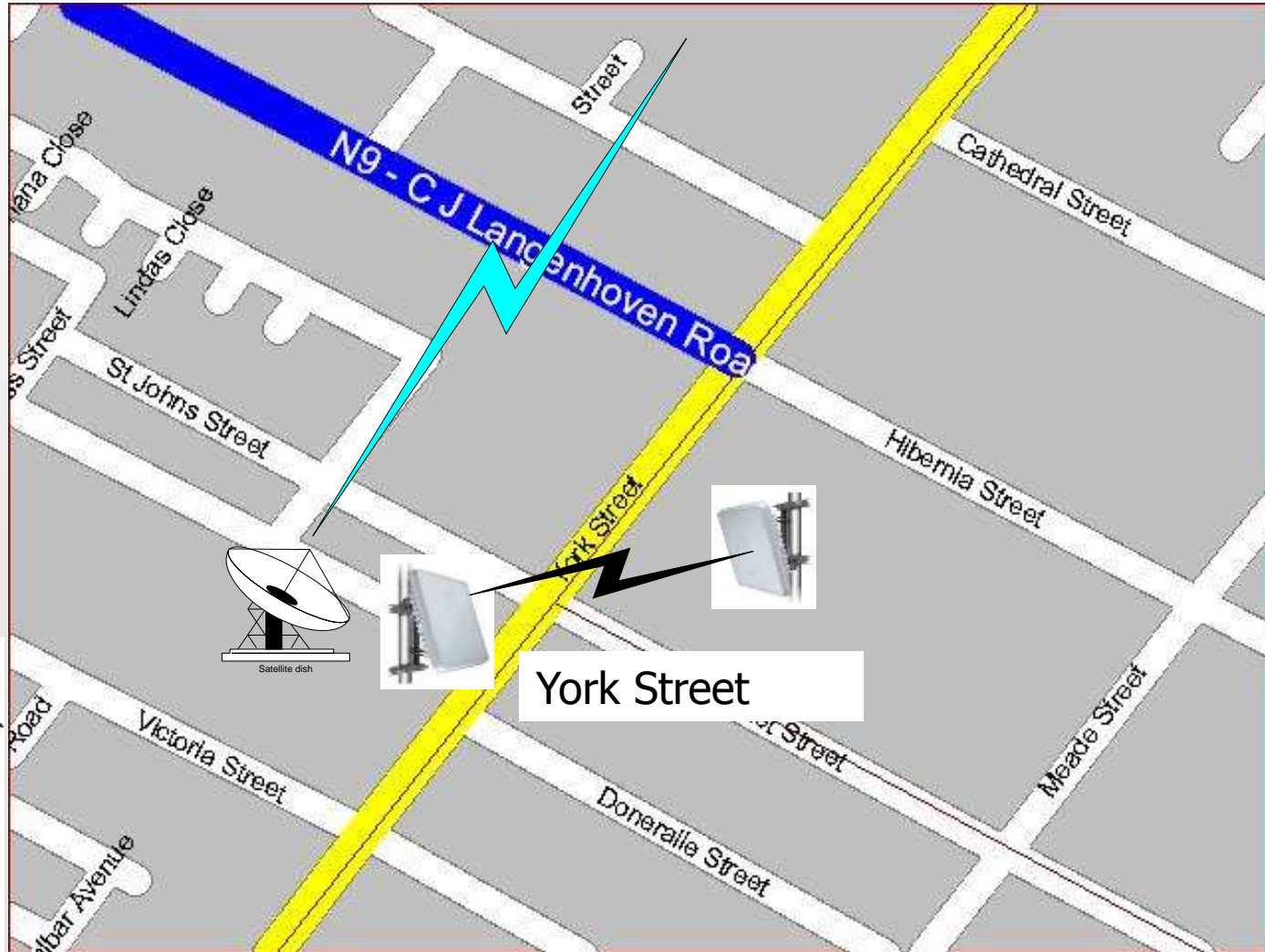


Data Network Setup Plan

Wednesday, July 27, 2005



Combining Satellite and Microwave Radio Links



Mobile VSAT Installation



Additional Mobile Options



Satellite Costs for W Cape DM

- Viasat VSAT Terminals from Sentech
 - Cost R22000.00
 - Or a 3yr Rental with maintenance costs R1200pm
- Bandwidth Costs
 - 128 kb/s with CIR of 8kb/s R2000.00 pm
 - 256 kb/s with CIR of 16kb/s R4000.00pm
- Combined Costs (34 links)
 - Total annual operational cost R1,500 000.00
 - Vs Telkom Quote of R3,500 000.00 for 64kb/s leased lines
- Mobile BGAN System from Inmarsat
 - Terminal costs R5000.00
 - Bandwidth costs R 35.00 per MB.

QUESTIONS ?



THE INVISIBLE POWER BEHIND YOUR CONNECTIVITY

Select Umoya to enter

