Benefits of Remote Access Terminals – SARPA 2010

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manage energy better

This presentation seeks to explain ....

+ **What a Remote Access Terminal (RAT) is, including;**

  - **Where** Remote Access Terminals are relevant and **why**

  - **What** parts constitute a multi-part Remote Access Solution

  - **Which** communication technologies are used and **why**

  - **How** the parts are mounted and **what** kinds of enclosures are used

  - **What** a typical **RAT** looks like and **what** capabilities it has

+ **What the software monitoring and controlling RAT's can do;**

  - **What** information can be read from the split prepayment meters

  - **What** site management capabilities are provided for Utility support staff

  - **What** auditing & interrogation features are provided for Revenue Protection

  - **What** load management and demand reduction features are provided

  - **What** additional services can be provided to Consumers

+ **How these systems form a standardised part of the Smart Grid**
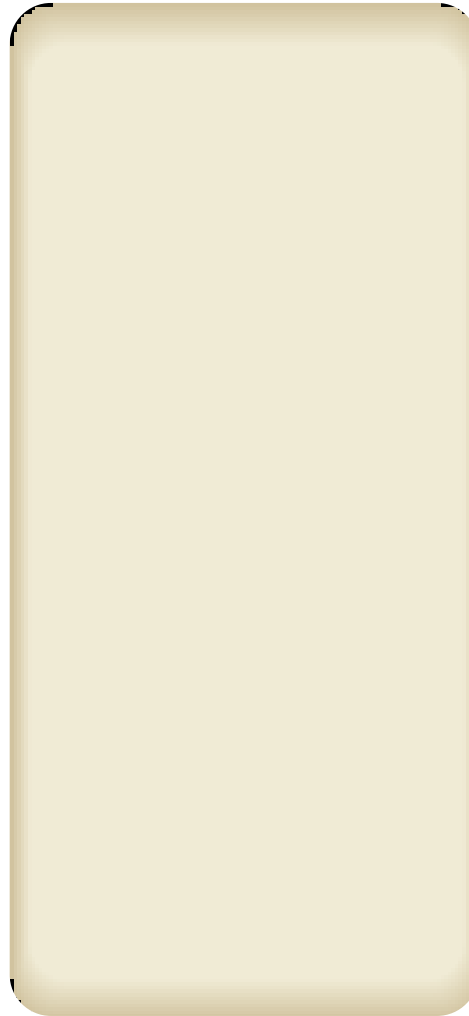
+ **How much money can be "saved"**

Global distribution of STS and AMI systems (2010)

AMI deployed	Unknown/Legacy systems	STS deployed
AMI planned	AMI/prepayment planned	

Rapid transition to **multi-part** **STS** prepayment **systems**

Multi-Part (Wired) Prepayment System

Single Part Prepayment Meter
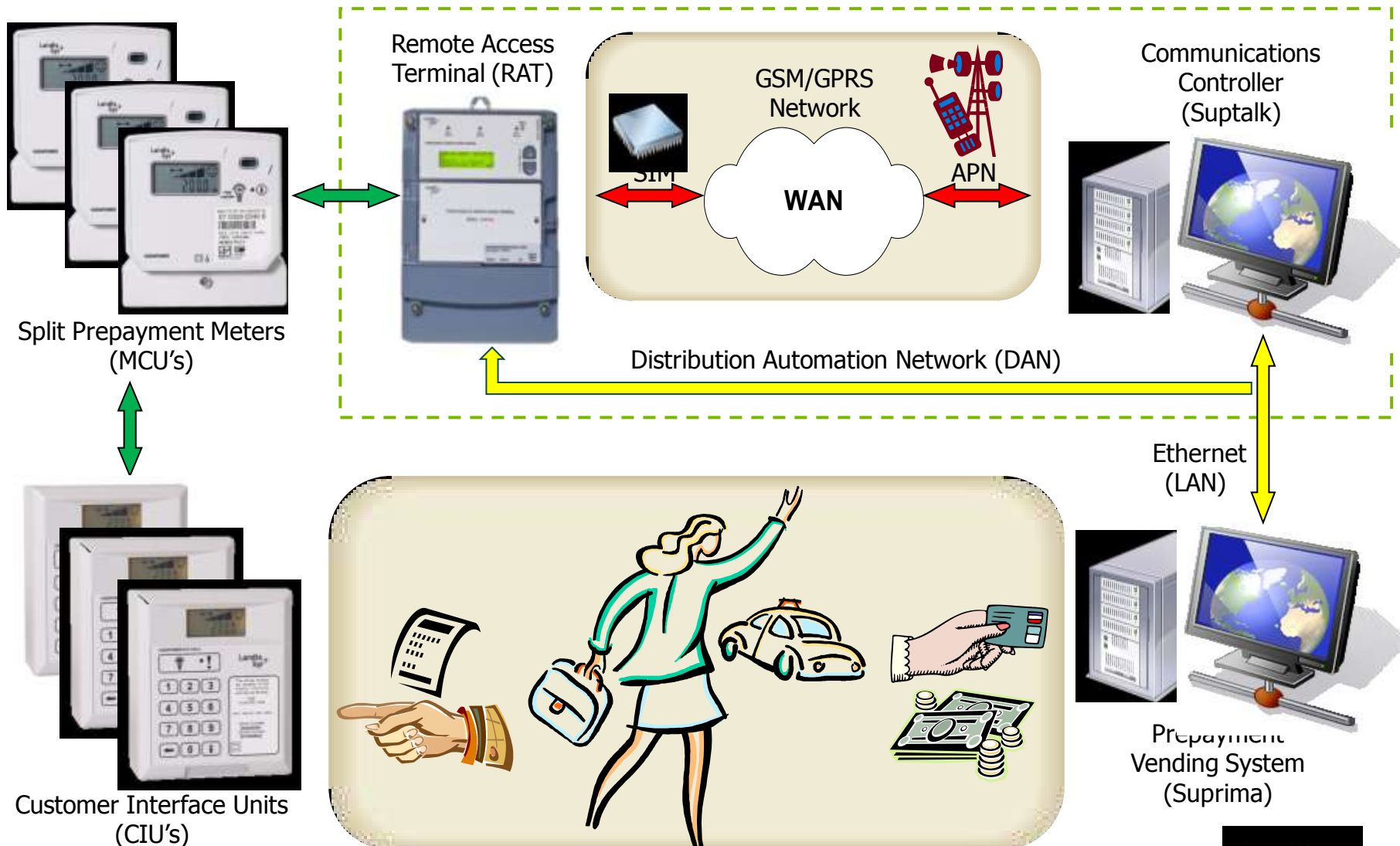
Multi-Part (PLC) Prepayment System

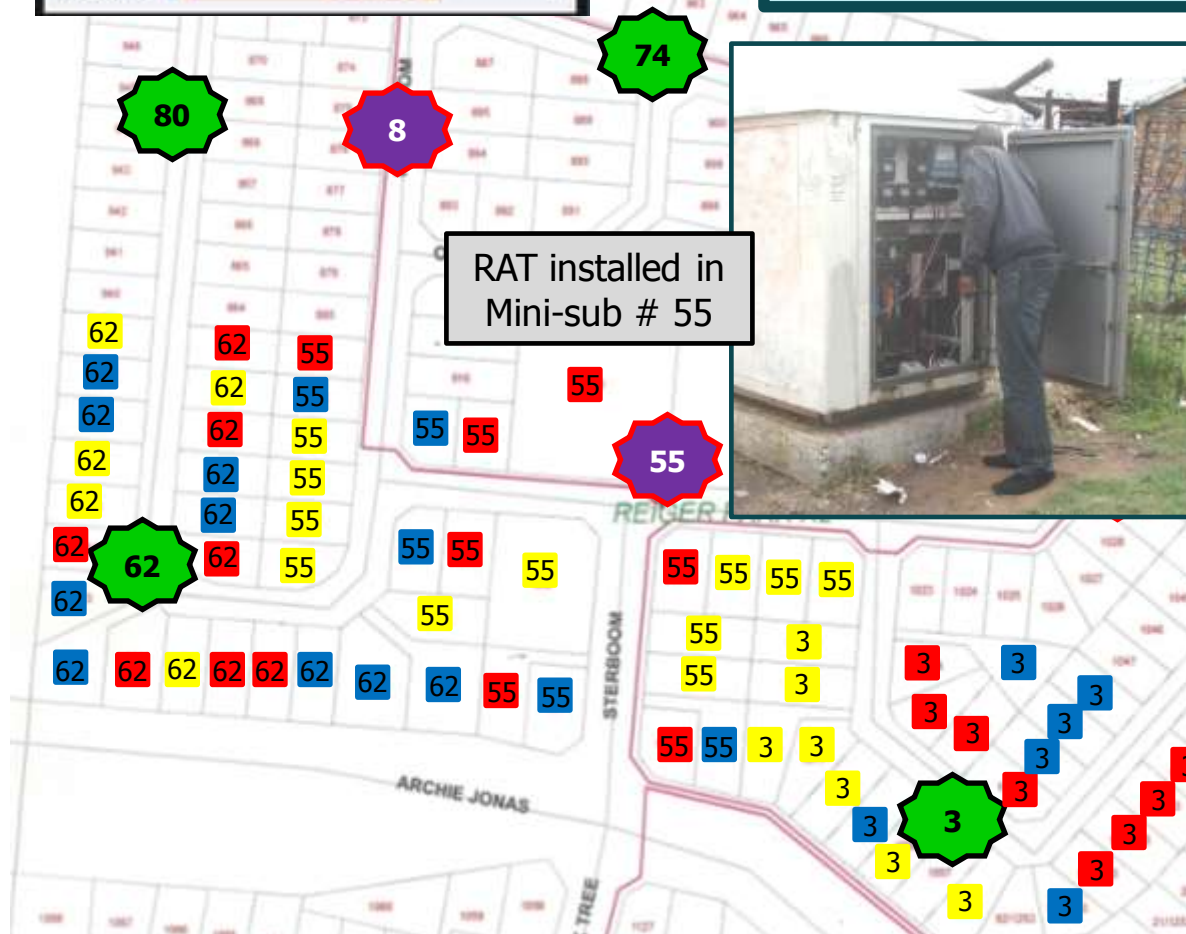# Multi-part remote access STS prepayment solutions

Split Prepayment Meters (MCU's)

Remote Access Terminal (RAT)

GSM/GPRS Network

SIM

WAN

APN

Communications Controller (Suptalk)

Distribution Automation Network (DAN)

Ethernet (LAN)

Customer Interface Units (CIU's)

Prepayment Vending System (Suprima)

Site characteristics – Clustered topology

RAT 2000010
2000010
May 3, 2010 23:48:40
Signal : 15 / 30
Meters : 68 / 99

xx Phase 1 (Red)	**xx** Mini-sub (with RAT)
yy Phase 2 (Blue)	**yy** Meter kiosks
zz Phase 3 (White)	

RAT installed in Mini-sub # 55

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Site characteristics – Distributed topology

Three Meter Panels

Block C
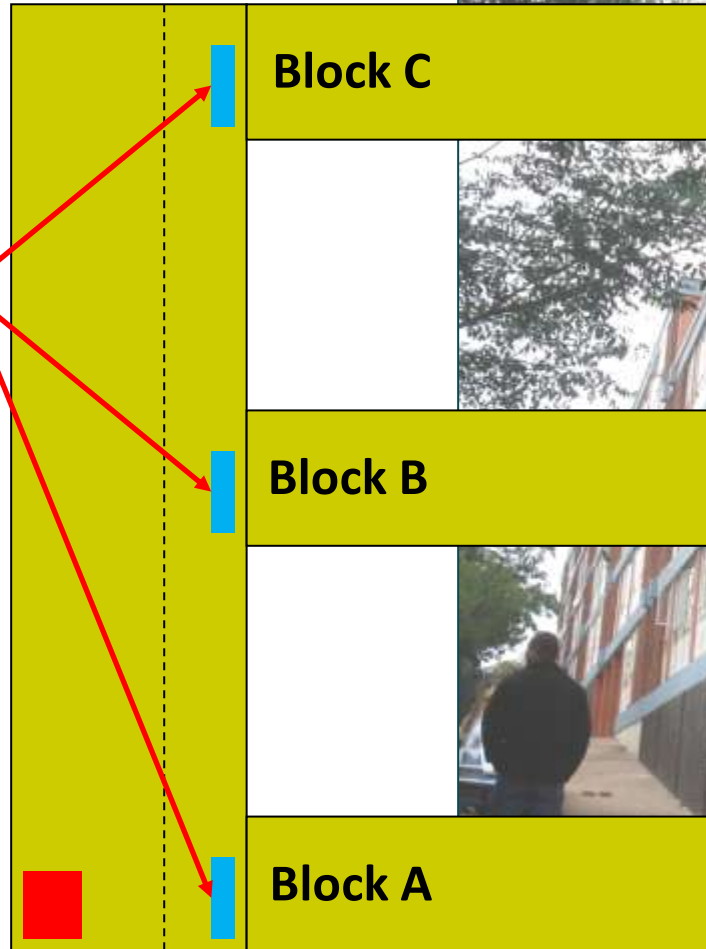
Block B

Block A

RAT installed in Sub-Station

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Sub-station **panel** layout

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ZMD I&C Meter
Used for check metering purposes

Remote Access
Terminal (RAT)
Connected to Three Phase Supply

Connection
Block

Circuit
Breaker
For isolation of RAT test set-up

Test Meters
Three Gemini PLC test meters to allow for own testing of token transfers etc without inconvenience to the customer

Customer
Interface Units
(CIU's)

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Typical RAT front panel features

Backlit LCD Display
Ease of use and fault finding

Lithium Battery
For "last gasp" communication to report a power failure

Ethernet Interface
For direct access with laptop for device configuration

LED Indicators
Indicates communication status on phases, power and error conditions

Menu Buttons
Scroll through menu functions and execute command button

Communication Modules
Modules fitted into enclosure under sealed cover

Capabilities that a **RAT** should provide

+ Flexible communication and deployment options, such as;

  – Operation on three phase supplies with various earthing schemes

  – Self discovery and remote access of **PLC** split prepayment meters

  – Remote access of **Wired** split meters via an optically isolated port

  – Isolated communications modules e.g. **GPRS** and **Ethernet**

+ Simple user interface with flexible input and output options, e.g;

  – Menu scroll and command buttons for firmware features

  – Two inputs, typically used to monitor sub-station or kiosk door switches

  – Two outputs, typically for alarms linked to inputs

  – **USB** port for local data transfer for on-site audits

+ Event monitoring, logging and data pass through functions, e.g;

  – Send **STS** tokens to selected prepayment meters

  – Read registers from **STS** meters via **IEC** standardised protocols

  – **Notification** and logging of meter tamper events and alarms

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Data access capabilities (from STS split meters)

+ Meter parameters that can be accessed

  - Meter serial number (DRN)
  - Meter software version
  - Available credit register (kWh)
  - Accumulated energy consumed register (kWh)
  - State of internal load switch (open/closed)
  - Instantaneous power (kW)
  - Maximum power limit setting
  - Power failure counter
  - **STS** key type & revision number
  - **STS** tariff index
  - **STS** supply group code
  - Status and options bytes
  - RSSI value (PLC signal strength)

Remote Access Terminal

PLC

PLC Prepayment Meter

Dashboard capabilities (Site inspections)

+ Typical capabilities

   – Indicates number of meters online

   – Indicates if meters have alarms or conditions that need investigation

   – Indicates GPRS communications strength & no of meters online

   – Rapid site health overview, each block represents a Remote Access Terminal

   – Block frame colour shows RAT status (OK, alarms, lost communications etc)

   – Facility to define RAT groups

+ Benefits

   – High level overview of status of RAT's for administrator – "Birds eye view"

   – Can "drill down" into a RAT for more details and audit of specific meters

Dashboard capabilities (Meter audits)

+ Typical capabilities

  – Status by meter serial number

  – Meter events (e.g. tampered)

  – Meter tasks (e.g. get register information)

  – Meter readings (half hourly readings) with filter, tabular and chart formats

  – Detailed meter status

  – Send STS tokens to the meter

+ Benefits

  – Remote audits – know the status of the meter, identify tampered meters

  – View meter register information on demand for fault finding and analysis
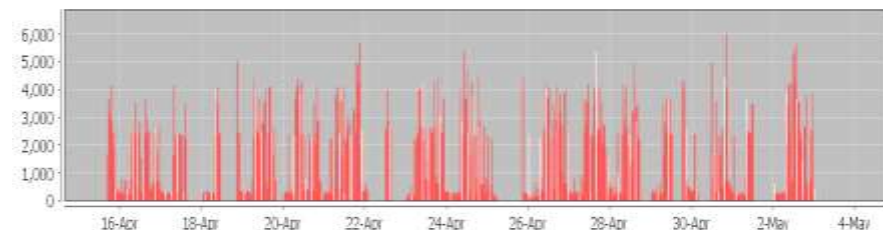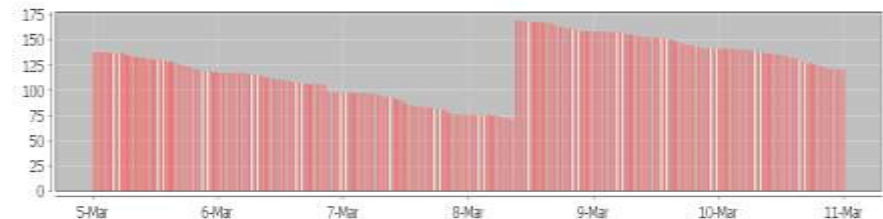
plus **Tamper** notifications ...

Meter is in the tamper mode and has no remaining credit

Remote Access Solution – Consumer benefits

+ Advanced on-line **STS** prepayment services, such as;

 − Automatic credit token transfers (from point of sale or internet vending)

 − Monthly distribution of free basic electricity tokens (saves travel costs)

 − Automated credit top-ups when authorized and funds available

 − On-line energy and demand monitoring to aid conservation of energy

 − Improved understanding of inclined block tariffs (if implemented at PoS)

+ Basic **AMI** credit metering services, such as;

 − On demand, or scheduled meter readings via internet or mobile website

 − On-line energy and demand monitoring to aid conservation of energy

+ Enhanced services from the Utility, such as;

 − On demand conversion from credit service to prepayment service or back (without a site visit or a swap out of the STS prepayment meter)

 − Improved outage detection and supply restoration verification checks

 − Remote activation of **energy limiting features** (scheduled or on demand)

 − Special **tariffs** and incentives when remote **PLC** load switches are fitted

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Integrating STS and AMI systems into a smart grid

+ Some customers in a **STS** prepayment meter site may decide to pay for conversion to a more complex smart AMI meter with;

  – Precise interval data, to benefit from maximum demand tariffs

  – Interfaces to others meters (e.g M-bus to gas and water meters)

  – Interfaces to advanced in-home displays and home automation networks

  – Over the air firmware updates to access novel features when released

+ These needs can be accommodated with **AMI** meters fitted with their own GSM/GPRS modems, that connect directly to the back office via **DLMS/Cosem** protocols

+ Utilities need to invest in multi-vendor integration layers to provide a flexible service offering. These should support the messaging structures of the IEC 61968 **Common Information Model**

+ Utilities should consider the benefits of **IDIS** compliance when the requirements have been published
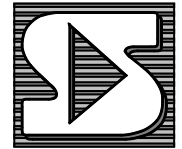
Commercial benefits of Remote Access Terminals

"Eskom loses R3.6 billion a year due to theft "

Elizabeth Dipuo Peters, Energy Minister, 30 June 2010

- Eskom and the country's municipalities lose more than **5%** of their annual turnover to electricity theft

- Up to **50%** (5850 GWh) of Eskom's non-technical losses in the 2008/09 financial year appear to be the result of theft

- This resulted in a financial loss of up to R3.6 billion a year for Eskom, and the same figure for municipalities

- But Peters pointed out that if the illegal connections causing the loss were made legal, the consumers would have received a percentage of their power use as free basic electricity (FBE). "Should each connection be using the average of 180kWh per month, it means the free basic electricity would have reduced the losses to around 72 percent of the above values and thus the loss would be reduced to R1.8 billion to R2.6 billion per year.

+ With Eskom and municipalities combined, and taking into account the impact of FBE, the **financial value amounts to R4.4 billion of lost revenue per annum** due to electricity theft.

Conclusions

+ Remote Access Terminals facilitate a **dramatic reduction of energy theft**
+ They are quick and easy to deploy and they are **self funding** from energy savings and revenue improvements
+ They connect existing & emerging STS meters into a **coherent smart grid strategy**
+ **Consumers** receive an enhanced, more flexible and more sustainable service

+ **Can you afford NOT to urgently fit RAT's to all your STS prepayment site's ?**