The development of a national online vending specification

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1. Introduction

Current pre-payment vending technology has been specified in 1993 in the NRS 009 process as well as in Eskom's common vending specifications in the mid 90's. The idea was to create a common vending system to ensure that all vending systems conform to the same basic requirements to vend to especially STS compatible meters. Many proprietary metering systems where however already in use. This fact resulted in the use of proprietary vending systems with STS capabilities. Although the interfacing equipment Standard Token Translator (STT) has been specified in the NRS 009 documentation, very few manufacturers developed a system. A new generation of vending systems are currently being developed by various manufacturers but no standards exist. Thus the need for a specification to ensure that the new generation of vending systems are compatible.

2. Reasons for development of the specification
Some of the main reasons for developing these specifications are as follows

a. The existing systems and specifications are outdated;
b. New amalgamated municipalities need integrated vending systems to serve a variety of meters and communities;
c. Available systems are not compatible and do not include facilities to vend to older meter technologies from other manufacturers;
d. Not all manufacturers are willing to share their older encryption technologies;
e. The vending industry itself does not come forward with suitable standards and no international standard exists for vending systems. The IEC is working on a concept of universal requirements for payment systems but a specification is far from completed. The end users thus had to step forward to facilitate the process.
f. REDs will require large integrated and inter-compatible systems in the near future;
g. Higher security and data processing capabilities are required;
h. Newer payment mechanisms need to be accommodated to facilitate better customer services.

3. Current process
An initiative from the STS Users Group as well as the fact that some larger municipalities need to update their systems resulted in the establishment of a working group to compile such a specification. The events leading up to the project as well as the current working group activities are as follows;

a. Presentations at AMEU (2000) technical meeting as well as Vending options(2001) did not effectively convey the message to the industry that standards need to be introduced in new vending systems;
b. At a meeting of the STS Users Group (Eskom and Municipalities) in January 2001 manufacturers were briefed about this requirement.
c. The support of the ESLC was obtained for this project;
d. Eskom provided the funds to appoint a person from TSI to perform this task
e. Nothing significant happened in the industry and the STS user group took a decision at a meeting in March 2002 to convene a meeting with manufacturers on 2002-4-8 to get their co-operation on compiling a specification. Some larger Municipalities at that stage already had tenders out for the replacement of existing systems.
f. The TSI person visited all vending manufacturers (April 2002) as well as a number of municipalities to get their input. This process however did not result in a significant contribution by any manufacturer in terms of a ready made specification;
g. At a meeting of the working group on 2002-8-12 it was decided to proceed without these inputs and this resulted in the draft scan report (RES/SC/02/17493) on the basic requirements. Manufacturers and STS User group members form part of the extended working group and will be involved in the specification process which should result in a new updated NRS 009 specification for online vending systems.
h. The draft scan report [1] has been circulated to all manufacturers and STS User Group members for comments (August 2002)

4. Online vs off line vending

Once the fact that a new specification is required has been established one has to elaborate on the options and possibilities that exist. What is really required by the industry and what will this contribute to the service delivery? One of the fundamental changes to new vending systems will be whether an offline or an online system is required. The exact definition can be debated but for the purpose of this paper the following definition will be applicable.

Off line systems can conclude transactions at a point of sale without direct communications with a management system at a higher level but data must be synchronized (uploaded) at specific intervals to ensure that transactions are recorded in the main database.

Online systems need a direct real time communications link between the point of sale and a centralized database to conclude any transaction. All authentication, authorization, encryption and recording is performed by the centralized management system.

5. Advantages vs disadvantages of an online system
a.   Advantages

i. Higher security due to the fact that all encryption and data are centralized an managed from one point;
ii. Transaction, EBSST and revenue information updated in real time;
iii. Better customer service through the new payment systems and vending channels e.g. internet, credit card, cell phone etc
iv. Encryption for proprietary and STS systems can be centralized;
v. Multiple vending contractors can be appointed as long as they all have access to the same centralized database;
vi. Much simpler POS terminals
vii. Arrears collection much simpler because customer data is centralized.

b. Disadvantages
i. Currently more expensive due to required communication systems;
ii. Vending not possible when communication line not operational;
iii. Communication not available in rural areas
iv. Current systems will lock customers into one supplier because no industry standards exist;
v. Requires a very secure communication and authentication system.

6. Requirements for online systems
These perspectives have been compiled after the visit of the project leader to all manufacturers and a number of utilities.

a. User perspectives
i. User should not be locked into a specific manufacturer
ii. EBSST functionality
iii. Debt recovery functionality
iv. Possibly include payment of other municipal services
v. Both STS and proprietary systems shall be supported
vi. Secure central database and encryption
vii. Off line vending support where online systems cannot be used or when communication breaks down
viii. Multiple vending channels eg internet, IVR, SMS, WANS, LANs, radios, X25;
ix. Compatible with various clients or token requestors eg CDU,POS,Cell Phone, 3rd party transaction switch, ATM etc
x. Extensive vending management tools.
xi. Open IT platforms.
xii. Compatibility with other financial systems.

b. Supplier perspectives
i. Integrate current vending systems in new systems
ii. Network and database redundancy catered for;
iii. Online systems should include offline support
iv. Specify system performance
v. Lack of standard banking interfaces should be addressed

vi.   Effect of Electronic communications and transaction bill should be addressed
vii.   Should be an interface specification
viii. Specify processes and not protocols
ix.   Various payment methods catered for
x.   Conformance testing must be specified and managed by a third party;

7. Encoding mechanisms : STS vs proprietary systems

The first pre-payment metering systems were installed in the early 90s. Each supplier designed a transfer protocol to ensure that information contained on the pre-payment credit token could not be copied or fraudulently generated. The only problem with this approach is the fact that non of the meters were compatible and an encoding card or a complete vending system required to vend to these meters. The result is that many utilities are still locked into the systems of specific meter suppliers
The solution to this situation was the development of the Standard Transfer Specification (STS) by Eskom in 1993. This forced all manufacturers to use the same transfer mechanism and meters were thus compatible in the sense that one STS vending system could be used to vend to all the different meters from different manufacturers. Meter manufacturers did not necessarily view this to be in their interest at the time but today every body experiences the advantages of standardization. In the RSA most conventional pre-payment meters sold today makes use of STS.

Large installed bases of proprietary meters however are still in use. This implies that to a certain extent, users are still locked into using specific vending systems for these meters . This is a serious disadvantage that needs to be addressed. The STS Users Group requested the different manufacturers to come to some sort of an agreement to make legacy technology available to all vending manufacturers to enable utilities to acquire new vending systems that can vend to STS as well as older meter technologies. This is especially important with the amalgamation of different municipalities into metros where a number of different older meters are still in use. Most manufacturers responded very positively to this request but there are still those manufacturers who think that their older technology will ensure their survival in the pre-payment market. This attitude is to the detriment of utilities and the whole industry and should thus be eradicated. Utilities should insist on standardized systems and refuse to buy from manufacturers who try to lock them into specific technologies. This situation illustrates the importance of standards in the pre-payment vending industry.

8. What needs to be specified?

It is quite important to decide what should be specified. Many standards and procedures already exist and it will be foolhardy to re-invent the wheel in many

cases. One should define the essence of what ensures compatibility as well as allow manufacturers to use techniques to differentiate their product from others in the field. As far as pre-payment meters are concerned the token encryption technology was specified and this was enough to ensure inter-operability.

The Scan report [1] covers the field of standardization but at this stage not all stakeholders agree. One will thus have to give everybody an opportunity to make comments and make a final decision based upon the best interest of the industry.

At this stage it seems necessary to ensure that the exchange of data between the point of sale and the main database should be specified as well as interface mechanisms to allow banking, cell phone and third party vending suppliers the opportunity to link into the vending customer database. It will also be necessary to ensure that all encryption technologies can be linked to the main encryption server to allow vending to STS as well as all the different proprietary systems.

9. Proposed framework

The figure(1) gives a basic layout of the proposed system. One can add a number of subsystems in terms of the various servers required but his figure shows the minimum system.
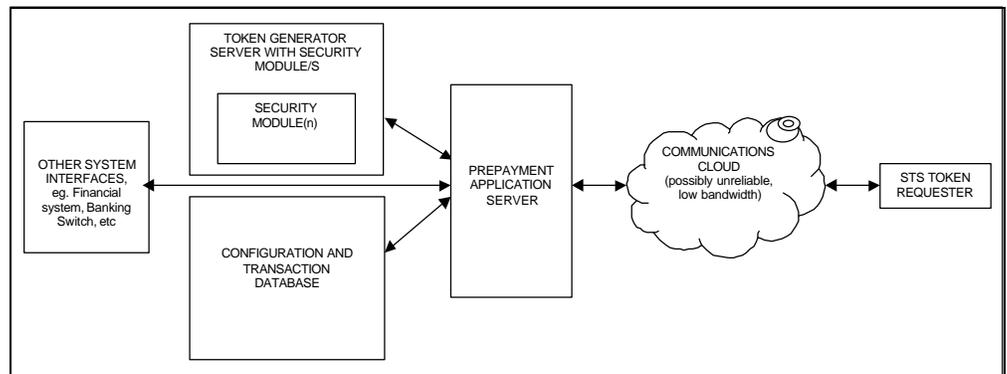

Figure 1 Proposed online vending system

The specification will have to cover the transaction messages between the token requester and the vending server. A common set of messages will have to be defined as well as the security and authentication mechanisms employed to ensure confidentiality and integrity of data exchanged. The specification will ensure that various manufacturers can supply tokens requesters (POS, CDU, Cell phone, as well as internet based systems) and that these devices will be compatible.

The system will be independent of the communication method used. One will thus be able to use the most appropriate and cost effective system in a particular situation.

10. Time line for developments

a. The scan report [1] will be finalized during August 2002
b. First draft of the proposed specification will be available for comment by end October 2002
c. Final version will probably not be available before the first quarter of 2003.

11. Vending in the Regional Electricity Distributors (REDs)

Vending systems will constitute a vital business machine in the REDs. A large number of consumers have already been connected to the grid by using pre-payment systems. The current vending systems need upgrading to ensure inter-operability once the industry is formed within the next few years. The business of selling electricity and provide good customer services will depend on how well the industry can upgrade it's business data systems. Some of the bigger metro's have already embarked on implementing systems by themselves. Successful integration depends without doubt on industry standards being implemented. Situations where one RED will vend on behalf of neighboring RED cannot be avoided due to the demarcation of distributions areas. This is especially true in the Gauteng region.

Interfacing with other business machines like financial, GIS, customer data bases, banking systems, third party s transaction switches ,call centers and maintenance systems is vital to ensure seamless integration of RED management information systems.

To ensure that REDs function effectively one will have to concentrate on the integration and standardization of information sub-systems.

12. Way ahead?

a. It is absolutely essential that the EDI as a unified front go ahead with the development of this specification
b. One should also cater for other services like water and arrears recovery .
c. The EDI has to take responsibility for this development and ensure that it is used for all vending systems to purchased in future;

13. Conclusion

a. Suppliers will support the development of the specification, but none want to propose a specification that could be used;

b. Industry standards will be used as far as possible
c. The electricity distribution industry (EDI) will have to provide the driving force to ensure that the manufacturers adopt the proposed specification. This will prevent possible future lock in situations;
d. The EDI will need the standardization even more once the REDs are established.
e. If a specific distributor cannot wait until the specification has been implemented it is recommended that a software update clause be included in their tender documents;
f. Current systems will have to be phased into new specifications
g. Off line capability will have to retained to cater for areas where online communications are not available or reliable.

14. References

[1] Scan report: Online Vending- Industry trend towards a industry specification, RES/SC/02/17493 by K Subramoney

Kobus vd Berg papers on online vending specs
[2] AMEU technical meeting 2000, Mosselbay, STS and Beyond
[3] Vending Options 2001, Standardisation and functionality of vending systems for the distribution industry
[4] Future vending systems for the Electricity Distribution Industry, January 2001
[5] Vending Solutions 2002, Can current systems implement EBSST?

[6] Cape Town : Vending specification 2002

ONLINE SYSTEM

CDU

CDU

x25

CDU

internet

Radio

LAN/WAN

CDU

SMS

leased line