

# ELECTRONIC BILLING SYSTEM BASED ON THE LOGISTRY

Jeffrey Simiri

Papua New Guinea Telecomm

## 論理決済方式

来千年代に向かって世界的な知的産業の発展が期待されている。これには、物理的資産に加え、論理的資産も構造的に分計・決済・流通できる通信網の構築が必要になる。筆者がPNGT用に検討していた電子課金認証方式は物理的な媒体使用料だけでなく、論理的な流通決済にも展開できる。この展開プロジェクトはGISやIFIPで話題になっているグローバル（通信・計算機を総合した多分野で、ラテン・漢字の両文化圏を含んだ多文化）な形態が望ましい。また、論理決済方式には技術・社会両面の検討が必要だが、「論理通貨を用いた技術的可能性の検討を独立して進める」ことと、「社会的制約が少なく国際通信環境のよいポートモレスビ市を一候補地とし、2000年に技術確認の現場試験を先行開始する」ことを提案している。

## 1.0 Introduction

The global information Society in the next millenium could be realized on a global network infrastructure. In the recently organized GIS and the coming IFIP, there are some topics such as ,Intellectual Property Right and Flow Through Telecorporation related to the title on this paper. The term 'Global' in the groups, is used in several points of view. One is globalisation of different technical fields, such as communication and computer. Another is globalization of multi-cultures such as Latin and Chinese characters based cultures, considering rapid developing areas toward the coming millenium. A typical example of both points of view is rapid developing communication in Papua New Guinea and software in Chinese cultural area, including China,Japan and Korea. First of all, both points will be separately discussed through my eyes in this paper. Next, related Science and Technology are introduced and showed a global solution for both problems, applying them.Finally, a research project and field trial on Electronic Billing System using a logical currency in the Pacific Ocean region will be proposed.

## 2.0 A problem of rapidly developing communication area

### 2.1 Background

The Papua New Guinea Telikom currently provides telecommunication services to over 50,00 subscribers. Papua New Guinea Telikom operates 65 radio repeater stations, spanning long distances, linking up with 44 telephone exchanges of which 12 are digital. It is also the aim of the Papua New Guinea telecommunication company to better improve the network by installing digital systems, thereby replacing the old analogue systems. The faceshift commenced with installations of digital system 12 exchanges, ATM switches for Data and currently digitalization of a radio route. (155 Mbit broadband.)

The Papua New Guinea' International Earth Station is located at Gerehu in Port Moresby, the nation's capital. It caters for two(2) types of operational functions referred to as STANDARD A and STANDARD B. The Standard A International Satellite employs an 18 meter parabolic dish while the Standard B domestic operates on a 11 metre diameter dish, which links up with 13 other sites in the domestic network through out the country. The Standard A International Station is connected directly to the International switching gateway, where switching and re-routing of International traffic is accomplished. In tune to the current trend towards digitalization we have also experienced recently new works in that regard. And some network routes are now utilizing optical fibre and this would greatly enhance capacity and bandwidth requirement.

During the last 10 years our communication network has developed and changed at such a rapid phase, just as we tend to keep in track with developments taking place all over the world mainly in modernized countries like Japan.

And in fact the Papua New Guinea telecomm utilizes more than 60% of Japanese made Telecommunication equipment.

With these improved changes in the network, the application of the electronic billing system would be tremendously important and would also play a major role in Telecommunication business especially during this multi-media and digitalization age.

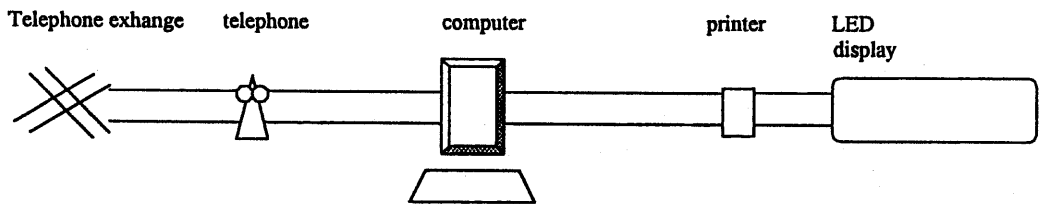
### 2.2 Electronic Billing in a rapidly developing communication area

The main concept that aired views about this topic was the fact that back in my country, Papua New Guinea where I was working with the Telecommunication company we had problems with drop-offs and outages, relating to public coin phones and card phones. The rate of a telephone line dropping off was quite substantial; for example two(2) in every five(5) customers cannot access the Telecomm network and obtain dial tone, because of the equipment's trigger failure. The coins and card phones have high failure rate in activating the Public Telephone line to obtain dial tone. And initially the main concept of the billing system involved the Telephone exchange, the computer and its accessories including telephone sets, printers and other accessories.

Currently the Billing cycle of Papua New Guinea Telikom is done every month. All the calls are captured at the exchange software control centre automatically onto a soft magnetic tape, of which after every month's ending the software is downloaded at our EDP(Electronic Data Processing) center for detailed billing record. The data base for the billing process is located within the system12 telephone exchange. The

database has adverse computational functions of call capturing, call forwarding, analyzing and mathematical operations of call charges. Unlike the old analogue systems where meter readings were normally taken at the telephone exchange (manually and charges calculated) the digital electronic billing system automatically calculates billing charges and also has the advantage of simultaneous operations of systems. Like many other digital systems a broader bandwidth means many operations can be carried out at any given time, error regenerations are possible and also noise reductions.

Fig a. Setup digram



The proposed research was based on a sub-system with an external database function to perform actually the same function as online telephone system however with a new tariff (charge) to cover cost of external devices. All operations are automatic. The interfacing cards/nodes will have to be clearly defined between the telephone Exchange and this system.

The billing process is initiated similarly to a normal telephone charge. A calling party initiates the call and soon after the called party answers, the billing cycle is automatically activated and relatively the cycle stops when the calling party quits. Drop offs, outages, uncompleted calls, hanging calls and all other malfunctioned call types shall be carefully addressed.

### 3.0 A Problem of Rapidly Developing Software Area

#### 3.1 My experience through the Monbusho Scholarship

During my Japanese orientation course supported by Monbusho, I learned the Japanese Language based on Chinese character's culture, which is different from English I learned in my country, based on latin characters. After completing the 6 months Japanese language course I attended Professor Ibuki's seminar titled '*Problems in the standardization of terminology for Computer education and for multiple cultures*' and also attended *NTT International forum* with many Asian Telecommunication companies' members. Through these experiences, I have been interested in multi-cultural problems with Latin and Chinese character based cultures

and enchanted a highly intellectual solution to sophisticate word processing of the latter culture, which I have never seen in our cultural area.

I believe the company 'JUST SYSTEMS' and its technology 'ATOK' promote their most promising culture in the coming millenium. However I have been shocked at recent newspaper reports that the financial ground of the company is threatened through industrial competition against another cultural area. To survive cultural competition and prevent intercultural destiny in this millenium, it is important not only to take anti-trust action against the restriction of hardware or operating system controlled by exclusive commercial policy, but also to cultivate by themselves in each cultural area through computer education and keep a nutritious for the rapidly developing software area taking advantage of the giga population.

To compensate for less or local deviation of computer teachers for the education, cyber school or cyber library across the ocean would be useful. In addition and appropriate economic environment based on ethics is also necessary. In the circumstance where culture depended application package software would be developed and survived against exclusive intended policy.

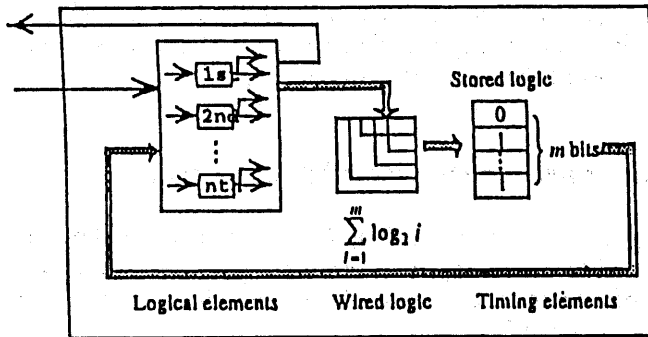
### 3.2 The Logistry

The ethics in the above mentioned sense includes the following.

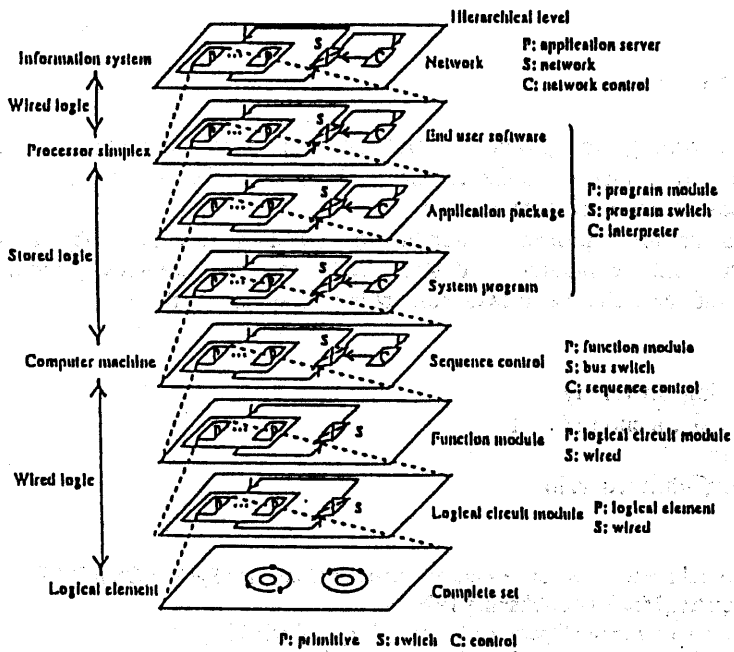
1. Structured division of each component of logical product
2. Flow of the product with appropriate price in global network
3. Establishment of Cyber knowledge right market

The Logistry provides a basic principle for the ethics, through the measuring model shown in Fig 2 to estimate each system component composed of hardware and software. In addition each hierarchical level of the software is clearly divided and provides estimate formula based on the structured model shown in Fig 3 for more advanced ethics. Moreover, a charging method of the estimated result through network are suggested in the logistry, of which a brief introduction is appended.

**Fig 2 Measurement model**



**Fig 3 Structured model**



### 3.3 Billing concept based on the Logistry

The overall billing concept of this system will be the summation of the operations of the various hierarchical levels in the structured model, those are logical circuit module, function module, sequence control, system program, application package, end user software, and network. The billing system shown in figure 1 would be available with slight modification to charge these divided knowledge rights.

### 4. Proposed research project on electronic billing system.

A proposed research project on Electronic Billing System based on the Logistry in this paper would be one of the promising solutions for the purpose. An integrated network technology found in reference (5) would be useful for an improvement from the original one shown in Fig 1

The subject of electronic billing system includes both technical and social issues. It is better, clarifying the technical aspect before combining any complex social problem. The first field trial would be better executed in a traditional social hazard free environment with Logical currency.

Relationship to any physical currency should be independently discussed parallel to the trial in a WG of this SIG for example.

### 5. Conclusion

PNG would be willing to provide a part of such clear environment in Port Moresby for the trial, located in the center of the Pacific Ocean Region, in-cooperate, co-existence of both cultures.

Any proposals of joint project, comments, or questions on the subject from communication and computer industry and related academy, including individuals would be welcome. Please contact the following address.

Jeffrey Simiri  
Tokyo Engineering University  
Hachioji-shi, Katakura chou, 1404-1  
Ibuki Laboratory  
E-MAIL: jeffrey@ib.it.teu.ac.jp

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## Appendix

An outline of the logistry and some examples of its applications are given below. More detailed information can be found in (1)-(4)

- 1 Scope of logic-based technology(cf(1) and (2) also see A1
- 2 Logic functions and their complete sets (cf(1) and (2),also see Fig A2)
- 3 Mathematical composition of logical functions based on complete sets (cf(1) and (4))
- 4 Structured hierarchical organisation (cf (1)-(4) also see Fig 3)
- 5 Conversion of classes of hierarchical levels (cf(1)-(3), also see Fig A3)
- 6 Library at every hierarchical level and generation of system from generic structure (cf(1)-(4) also see fig A4 for generic model)
- 7 Preparation methodology for generic structure(cf(2) also see Fig A4 for life cycle)
- 8 Quantitative measure of information and processing media for evaluation and ethics of system (cf(1)-(3), also see Fig 2 for measurement model)

Fig A1 Scope of the Logistry

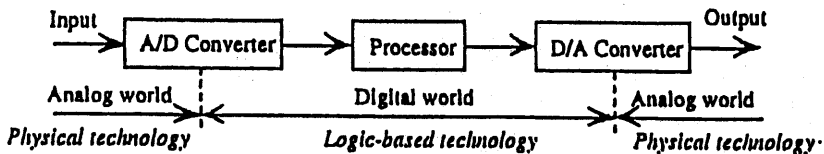
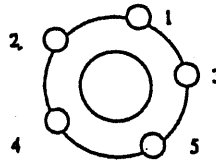
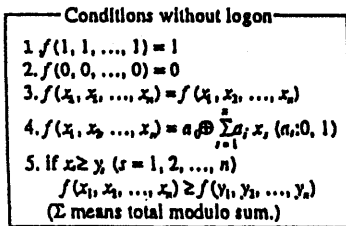
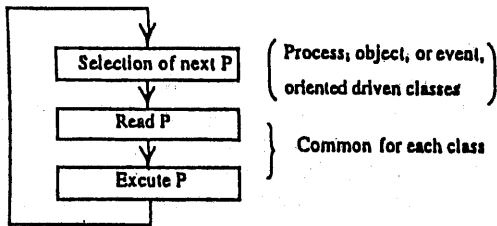


Fig A2 Logon model for logically complete set



Complete Set Contains all logons

**Fig A3 Conversion principle and classification of selection mechanisms**



**Fig A4 Generic model and life cycle of library**

