Voice Infrastructure Development
Proposal for
Rutgers, The State University of New Jersey

Prepared by the Telecommunications Division
Enterprise Systems and Services
Office of Information Technology
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Executive Summary

The university has consistently generated a profit of approximately $1.4 million annually that is derived from billing associated with campus wide voice services across all constituents. These funds are collected via university account 2-00124 and returned to Central Administration.

The voice infrastructure, which comprises phones, switches and PBX's (Private Branch eXchange), etc, varies greatly within the university. Some financially fortunate academic and research departments have funded their own phone systems, switches and PBX's. Other less financially capable departments are still using antiquated voice systems that utilize key sets on old building wiring and in-house building/cable plant. Many of the dormitories are still using old building wiring for voice connectivity.

This proposal outlines a plan to utilize a portion of the profits generated to develop a unified voice infrastructure throughout the university. There would be a gradual shift of funds over four years to effect a methodical implementation of vastly improved voice facilities and its subsequent support. This would mean new building wiring where appropriate and several centralized switches to serve multiple areas throughout the university. Fortunately, there are many large buildings that are wired with Rutgers owned fiber cable in accordance with RUNet and industry specifications. Additionally, there are available duct banks and points of entry that would facilitate a quicker and less costly implementation. Outside construction and cable plant regularly constitute the largest portion of expenditure when building technology infrastructure. Of relevancy, is the amount of this work already undertaken via the RUNet 2000 Project?

Although this project will be an ongoing effort over several years, it is expected that there will be a dramatic improvement in voice infrastructure over the initial four years, as well as service improvement and convergence toward technology standardization.

Present Financial Snapshot

<u>Voice account #2-00124 – Reverting to Central Administration</u>

Net from telephone line charges @$17.20/line:	$1,300,000
Net from toll / calling Charges @ $0.12/minute:	$600,000
Total of Line & Toll charges:	$1,900,000
Maintenance costs:	-$500,000

Voice Net - **$1,400,000**

Total annual net to Central Administration - $1,400,000

Financial Synopsis – Current and Proposed

		Current			
Item	**30-Jun-05**	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Voice Clearing account					
Net From Telephone Line Charges	1,300,000	1,300,000	1,300,000	1,300,000	1,300,000
Net from Toll / Calling Charges	600,000	360,000	240,000	120,000	0
Maintenance & Verizon Charges	(500,000)	(525,000)	(551,250)	(578,813)	(607,753)
Total	1,400,000	1,135,000	988,750	841,188	692,247

		Proposed			
Item	**30-Jun-05**	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Total Net to Central Administration	1,050,000	567,500	247,188	120,000	0
Infrastructure Development	**350,000**	**567,500**	**741,563**	**721,188**	**692,247**

The Current State

The university currently utilizes both analog and digital Centrex telephone services for all New Brunswick campuses. These services are provided by Verizon Communications. Layered on top of these Centrex services are numerous telephone systems ranging from single line telephone instruments to state-of-the-art PBX's. This is primarily due to a decentralized approach for both funding and planning of voice services across departments and campuses. The following is a list of various telephone systems deployed across the New Brunswick Area Campuses in varying quantities.

Livingston Campus
Nortel Networks Option
Nortel Norstar Electronic Key System
Avaya Merlin Legend Electronic Key Systems
AT&T Merlin Key Systems
AT&T/Lucent Partner Key Systems
1 A 2 Key Sets
Multi Line Analog Telephone Sets (1-4 Lines)
Single Line Analog Telephone Sets

Busch Campus
Nortel Option 11 PBXs
Nortel Business Communications Manager Key/VOIP
Nortel Norstar Electronic Key Systems
Cisco Call Manager VoIP System
Avaya Prologix PBX

AT&T Merlin Key Systems (All Models to include Classic Systems)
AT&T/Lucent/Avaya Partner Key systems
1 A 2 Key Systems
Multi Line Analog Telephone Sets (1-4 Lines)
Single Line Analog Telephone Sets

College Avenue Campus
Nortel Option 11 PBX
Nortel Norstar Electronic Key System
Avaya G3SI PBXs
Avaya 8300 PBX
Avaya Merlin Magix Electronic Key Systems
Avaya Merlin Legend Electronic Key Systems
Avaya/Lucent/AT&T Partner Key Systems
AT&T Merlin Key Systems (All Models to include Classic Systems)
1 A 2 Key Systems
Multi Line Analog Telephone Sets (1-4 Lines)
Single Line Analog Telephone Sets

Cook Douglass Campus
Nortel Option 11 PBX
Nortel Norstar Electronic Key System
Nortel Business Communications Manager Key System
Cisco Call Manager VoIP System (Supports remote Campus locations)
Avaya G3SI PBX
Avaya 8700 PBX
Avaya Merlin Magix Electronic Key System
Avaya Merlin Legend Electronic Key Systems
Avaya/Lucent/AT&T Partner Key Systems
AT&T Merlin Key Systems (All Models to include Classic Systems)
1 A 2 Key Systems
Multi Line Analog Telephone Sets (1-4 Lines)
Single Line Analog Telephone Sets

There are several departments within the university currently searching for their own telephone solutions. Individual and departmental solutions will only promulgate fragmentation and hamper a unified architecture throughout the university. Some of these departments are as follows:

1. Office of Budget and Resource Studies – They would like to upgrade their existing system so that they don't have to share greetings with the other departments on their telephone system in Van Nest Hall.

2. Office of Institutional Research – They are looking to purchase a Nortel Business Communications Manager (BCM) Telephone System to support them and the other departments in Geology Hall.

3. Faculty of Arts and Science –They are investigating a Voice over Internet Protocol (VoIP) system that could support all of their units across all campuses

4. Department of Computer Science – Would like a VoIP system that could be deployed for both the CORE Building and Hill Center. They would like to team up with Faculty of Arts and Science.

5. CAIP – They would like to team up with Faculty of Arts Science and the Department of Computer Science.

Please note that the above departments would fund these systems with departmental funds (i.e. year end funds or existing telephone budgets).

Proposal

- Develop and implement an overall voice architecture that will serve the needs of the various departments within the university.

- Finance the project(s) through a proposed gradual shift of funds from the profit generated within the voice operation.

- Maintain telephone line charges to cover cost and finance ongoing improvements essential to the health and viability of the voice infrastructure.

- Reduce toll charges on administration Centrex to cost over 4 years. This will be the result of an improved Verizon rate structure and other discounting.

- Hire one PBX / switch expert to manage the subsequent rollout and implementation of this voice project.

- Develop a capital reinvestment program to maintain a technological refresh of our voice infrastructure.

Voice Plan

This will be a campus wide deployment utilizing RUNet fiber, conduits, entrance facilities and building wiring to feed buildings and departments appropriately. Antiquated phone and 1A2 key systems will be eliminated as deployment commences throughout the campuses. Implementation will be completed singularly by campus. The projected sequential rollout will be as follows:

- Livingston
- College Avenue
- Busch
- Cook/Douglass
- Implementation and/or integration to Newark
- Implementation and/or integration to Camden

Depending upon the status of Newark and Camden campus facilities, it may behoove the university to integrate these into the overall voice architecture or add them to the implementation schedule as depicted above.

In cases within the project area, where local departmental phone systems were recently installed, these can be re-deployed where applicable. It can be expected that re-deployment of usable systems will be targeted for lower priority campuses on the rollout schedule, or building moves that can benefit from this equipment prior to their scheduled rollout.

Monitoring tools will be installed as part of this overall plan to ensure a high level of service throughout the university. Proper use of these tools will allow pro-active management in lieu of reactive management to events and issues. A tangential benefit is better utilization of technical resources and expediency to potential, marginal or current service issues.

Tangible Benefits

The benefits of implementing a university wide architecture for voice services are of paramount importance. In addition to creating a scalable architecture, there are tangible benefits that can be immediately realized.

- This will create a unified voice architecture and homogeneity throughout the university.
- There will be an equitable distribution of phone services across all departments.
- Improved fiscal management of the technical infrastructure.
- The ability to improve the numbering plans, hence better structure and utilization.
- Improved service level via pro-active management and tool sets.
- Unified voice messaging platform.

Timeframe and Schedule

Implementing standardized voice architecture throughout the university will require several years of effort. It is envisioned that no more than a single campus along with ancillary work will be accomplished each year. This is primarily a result of financial constraints, overall magnitude of the project and the need for a methodical approach to rejuvenating a largely ignored component of university infrastructure. There is the expectation that significant improvement will be accomplished yearly.

Assumptions for Calculations

1. Telephone line charges are held constant.
2. Maintenance and Verizon charges increase 5% annually.
3. Profit from line charges will be used as capital investment for voice infrastructure.
4. Toll and calling charges will be reduced to straight cost recovery over four years.

Profit from toll / calling charges while existent will revert to Central Administration.