IMPROVED CUSTOMER SERVICE THROUGH AUTOMATION AND ENHANCED RESPONSIVENESS

NICK HAMILTON-PIERCY & JOHN ANDERSON

ROGERS ENGINEERING

ABSTRACT

This paper describes how the foundation of good customer service (quality, reliable distribution of pictures) is enhanced by a fully automated network management monitoring system with alternate signal source and transmission path switching. Also described are the integration of automated repair crew dispatch (digital dispatching and terminals within the trucks) and the voice responses of the business office and repair answer with the network management systems to further enhance quality service.

The foregoing approach is described through a "systems approach" using block schematics and examples of applications to implement such an automated approach.

BACKGROUND

How customers are taken care of will become the ultimate management opportunity in a world that is rapidly becoming Customer driven. Companies that will be successful in the 90's treat customer service as a key component in their strategic planning process.

INTRODUCTION

Like many other companies within the Cable Television Industry, Rogers has established lofty customer service goals in response to rising customer expectations. Part of our Corporate Mission Statement says that "we shall be known consistently as providers of outstanding customer service." However, there is an enormous amount of effort required between simply making these statements and turning them into reality, particularly if we rely on existing operating methods and technologies. Rogers recognized quite some time ago that if we were to realize dramatic changes in our levels of customer service, then simply adding more staff or processes to the existing operating system would not bring about these changes. We would have to make fundamental changes to our operations and bring in new technologies to create new functions and opportunities for improvement that previously did not exist.

To accomplish this we inaugurated a project called RACE which stands for Rogers Advanced Customer Environment. RACE's goal is to supply the tools to our staff to provide an improved level of customer service that is quick, comprehensive and economical. We will provide our staff with the proper information and support so that they can deal immediately with customer problems and resolve them with minimum call-backs or repeat visits. At the same time, we want to provide this enhanced level of service without increasing existing staff levels and operating costs.

Two major initiatives have been taken to bring this about:

1) Repetitive, mundane functions were identified and targeted for automation (i.e. computerization) as much as possible.

2) Interfaces were established to integrate existing customer service technologies with new ones in order to leverage more effectivity from each of the stand-alone systems.

The technologies in existence prior to RACE included a Computerized Billing and Customer Service Data Base, a Computer-Aided Drafting and Design System (CADD) and Automatic Telephone Call Distributors (ACD). However, each of these were isolated systems with no interconnection for shared facilities or functionality. New technologies under consideration or in the process of implementation are Voice Response Units (VRU's) to automate incoming and outgoing phone traffic; Digital Truck Dispatching which creates a "paperless" work order cycle and makes information available on CRT screens in each service vehicle; and Network Management (Status Monitoring and Control) to provide feedback on performance and control of the components within the microwave, fibre optic and co-axial networks. Each technology had been fully justified based on its own individual merits and contributions to the Rogers customer service plan. However, through interconnection of these technologies there is the potential for enormous additional benefit at a small incremental cost.

Figure 1 is a block diagram of the interconnection of the various customer service technologies using a local area network. Each technology has an integral translator that converts its proprietary protocol to open (ISO/OSI) data packet standards. Once on the network, data can be transferred freely to any device. The network is compatible with distributed components and remote terminals. New technologies can be added or deleted without affecting the functionality of others. The Integrator/Server is the "intelligence" in the network. It is programmed to take specific actions and set priorities under certain combinations of conditions being reported. It adds a level of sophistication to make the configuration more than just a data exchange network.

CASE STUDIES

The following fictitious "Case Studies" are offered to provide a vision of both Pre and Post RACE environments. Although hypothetical, the pre-RACE case study is based upon current practices.

Case Study 1/Pre-Race

It is a Saturday evening at 7:30 p.m. during prime time viewing hours. A blown amplifier module has caused an outage somewhere in the system. Suddenly there are 200 phone calls to the office. Part-time dispatchers are on duty this evening, and can see no correlation between the streets, and call out the entire standby fleet available (four trucks) to the affected homes in time stamped order.

The four trucks proceed through the list of calls and gradually begin to piece together a hypothesis of a major outage.

Meanwhile customer homes have been visited, and restoration of service was not complete, although the intrusion is.

ROGERS ADVANCED CUSTOMER ENVIRONMENT

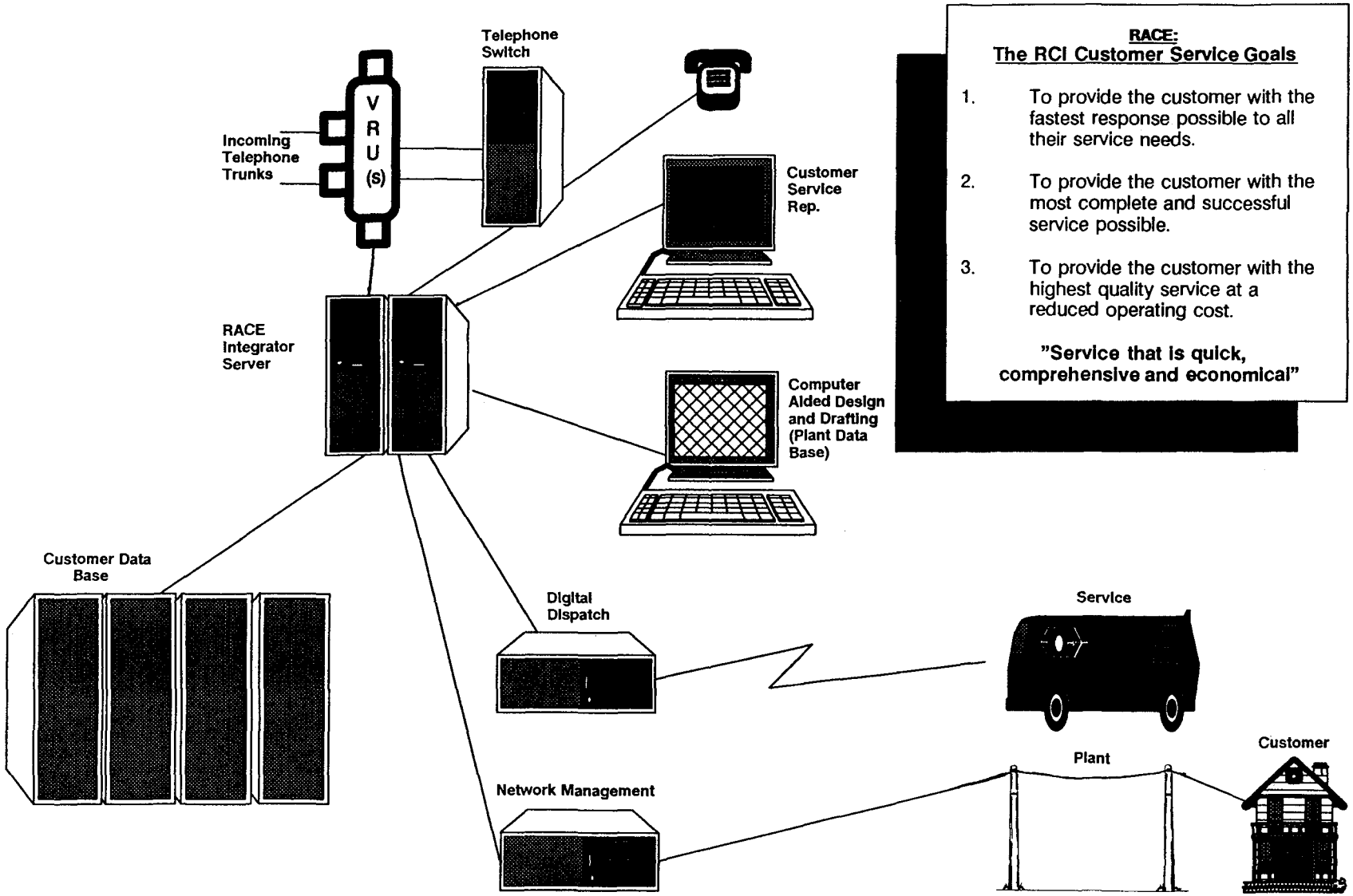

FIGURE 1.

After a couple of hours, and the review of several plant maps by the dispatchers, a common point of failure is assumed and a truck is dispatched to this location. (This assumes that the plant maps are current and reliable).

A service vehicle arrives at the common point of failure two hours from the time of outage. Quickly he is able to determine that he has had no prior experience with the unit in question. However, working with the radio he is able to obtain assistance in correcting the problem. Although his service vehicle has thousands of dollars worth of inventory, he is without the necessary module for repair. Fortunately, the service technician on the other end of the radio (to whom was providing him with assistance) has the module necessary and races for the outage destination.

Finally after three hours of outage, the problem is corrected and service is restored.

Pre-RACE Result

There were so many problems in Case Study #1 that it would be just as lengthy to point them out as to repeat the story. One point that may be hidden, is that even with millions of dollars of "state-of-the-art" technologies, simple location and correction of this outage could only be minimally shortened.

There is a weakness because there is no integration of the systems. The technologies are functioning, but only on the strengths of their own abilities. One could spend millions of dollars on new technologies, and not realize the maximum "hidden" potential benefits.

RACE is designed from the inception of new technologies to provide a comprehensive customer service environment regardless of the human resources available.

Case Study 2/Post-RACE

The same outage situation has occurred, but RACE technology is in place.

Thirty percent of the incoming calls are answered by the VRU's. ANI provides the subscribers home phone number, and VRU's run through the traditional CSR diagnostic check list, prior to posting the call as a viable outage.

CSR's perform the same function as the VRU's, where the customer either has no touch tone phone, or simply wants to deal with another human. Since the CSR's load has been reduced by the VRU partner, he/she is able to offer personal assistance to even the nastiest of callers.

As outages (homes or business customers) are confirmed by the CSR's and VRU's, the information is routed to the Network Management System which provides a detailed graphic display of the plant and recorded outages. By using stored "knowledge" of the plant, the Network Management System is able to "look for" common points of failure. It does this by traversing "up the tree", looking for the components common to major outages.

Network Management locates a common point of failure on the screen and displays this to the dispatchers. At

the same time the Network Management System issues a message into the network asking for status information on the suspected amplifier. The response from the amplifier is compared to standard parameters stored within the Network data base for further analysis.

Network Management automatically issues a message to the Digital Dispatch System for a support vehicle to proceed to the identified common point.

Network Management has determined the common point of failure, the probable equipment failure and the current and ideal operational parameters.

Before leaving for the call, the technicians knows:

- where the problem is
- what the problem is
- what he should have to correct it

Also available is a work order history for the malfunctioning amplifier.

Utilizing an integrated stores and vehicle inventory data base, the system has selected a truck known to contain the parts required to repair or replace the damaged component. With the integrated resources data base, the system has selected the service technician who is most able to correct the given outage in as short a time as possible. This would also allow us to reduce the duplication of expensive inventories between the stores and service vehicle.

More advanced mobile terminal technology can be integrated and enhanced to provide detailed plant maps to help the service technician locate the damaged equipment. With fully portable and powerful terminals, it is possible to provide the service technician with an "automated assistant" rehearsed in diagnostic procedure for the suspected device.

The dispatchers now know where the outage is, and its scope (area of outage). This information can be relayed BACK to the CSR's and VRU's for presentation to the incoming subscriber call.

For example (via VRU); "...Please enter your home phone number...We currently have an outage bordered by York Mills and Lawrence, and Leslie and Don Mills. A service vehicle is on location, and should have the service restored within approximately twenty minutes...."

Twenty minutes later service is restored.

The status screens are updated with call cleared, the VRU and CSR console messages are automatically dropped.

Except for the actual outage, the customer was not further inconvenienced by an in-home visit. Service was restored to multiple reported outages by a single service vehicle.

Post RACE Result

What has changed? The technologies are essentially the same, yet the results were much better than Pre-RACE, with less staff.

The difference is the integration provided by RACE. RACE combines the

strengths of the autonomous technologies, driven by the Customer Service Goals.

No subscribers need be bothered in their home. Only one truck rolled. Customers were informed of the situation. Part-time staff are able to perform like seasoned professionals. The customer's service was restored far faster than in traditional modes.

PREVIOUSLY UNATTAINABLE LEVELS IN CUSTOMER SERVICE BECOME ROUTINE UNDER RACE.

One "hidden asset" is that the Network Management Systems normally would have identified a failing part long before actual failure. Under normal RACE operation, the Network Management System cyclically inspects all the plant components looking for potential points of failure. Under normal RACE operation, a work order would have been issued to inspect the amplifier prior to total failure.

Network Management

Effective management of our coaxial, fibre optic and microwave networks is crucial for the delivery of excellent customer service. Traditionally, cable TV systems have employed, if at all, a single-vendor "status monitoring" system which simply reported on the current status of individual trunk amplifiers.

With the implementation of the Rogers Fiber Architecture (ref. 1989 NCTA Technical Papers) with its hierarchy of Primary Fibre Hubs, Secondary Hubs and co-axial plant, we recognized the need for a more comprehensive network management system that not only monitored the status of the networks, but also provided a means to control switching functions for backup facilities should failures ever occur. The network management system would also need to function in a multi-vendor environment with an hierarchy of network technologies (i.e. FM fibre, Digital Fibre, AM fibre, AM co-ax, microwave links, TVRO's). Rogers currently has such a system under development with multiple networked graphical work stations. The system is being developed with standard OSI network management translators to provide the access link to the various vendors' proprietary hardware platforms. The current Fibre Network Management System is scheduled for completion in 1990 and will offer true cross-system management facilities to all of the fibre components, including laser transmitters, receivers, modulators/demodulators, and redundancy switching (See Figure 2).

The Network Management applications available in the system include:

a) Monitoring - Automated monitoring of the network's transmission, received signal processing, and equipment building facilities provides a continuous assessment of the infrastructure's operation. It provides immediate feed-back on a malfunction prior to an effect being noticed by the customers. Each part of the distribution infrastructure needs its own unique monitoring function tailored to the types of malfunctions expected in that part of the network:

1) Coaxial Trunk Network
2) Fibre Supertrunk and Trunk Network
3) Equipment Powering and Auxiliary Powering

Rogers Fiber Architecture: Network Management

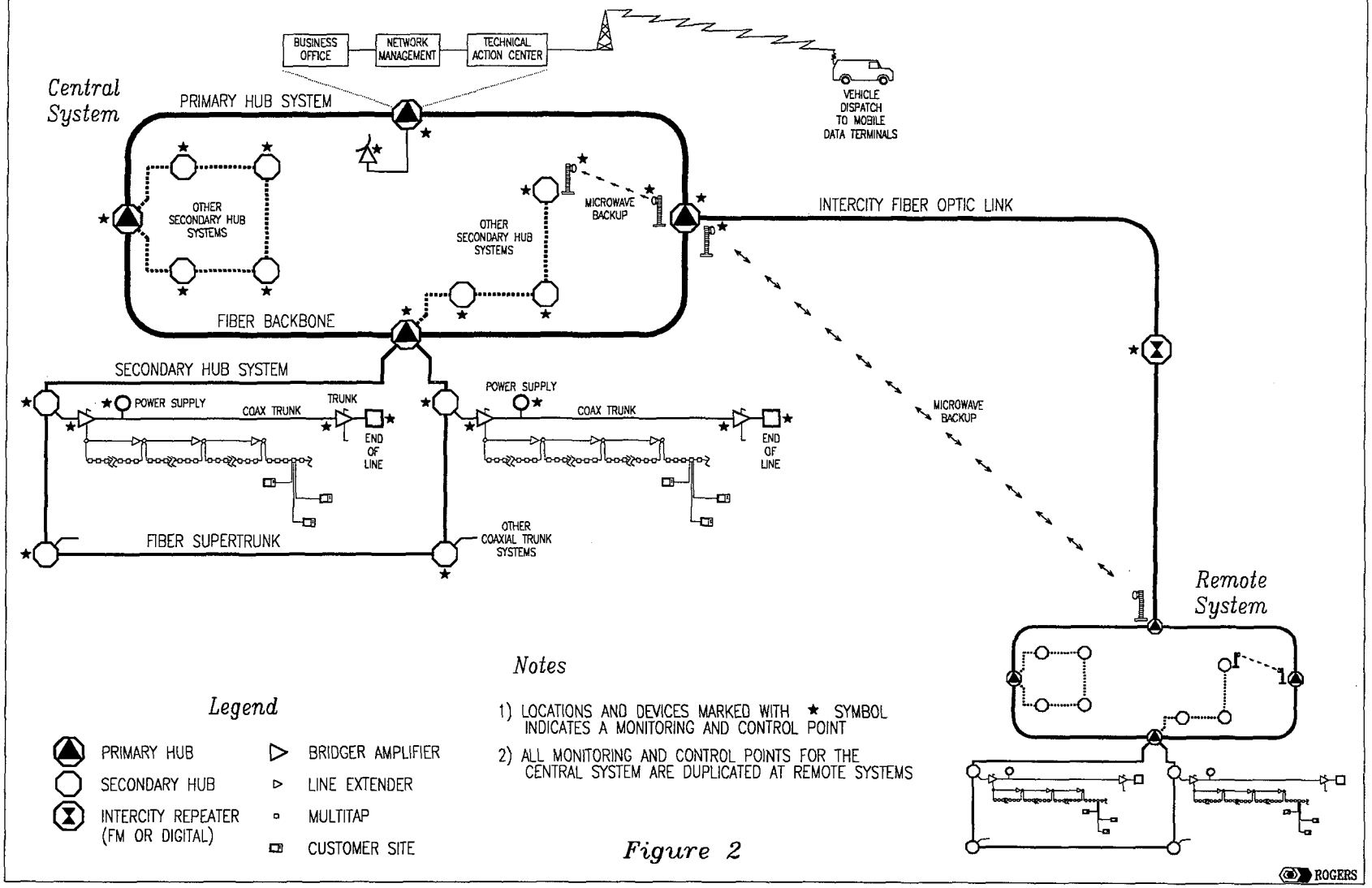

Figure 2

4) Headend Hubs and Microwave
5) Equipment Shelters and Buildings
6) Satellite Uplinks, Downlinks
7) Data Modems and Multiplexors
8) Extending Monitoring Visibility into Interconnected Networks Operated by Others
9) Providing Visibility of the Network Monitoring Functions for use by the other operator of an Interconnected Network or by specialized Customers connected to the Network.
10) Ability to make available remote objective measurements from any principal node or extremity of the network.
11) Ability to make available remote subjective assessment of video and audio quality from any principal node or extremity of the network.

In addition to those benefits discussed, comprehensive performance and functional monitoring of all parts of the network allows maintenance functions to be dispatched only to where needed. This eliminates need for random patrolling of the network and its elements by maintenance crews and the many non-productive adjustments and measurements they routinely conduct. A substantial reduction in maintenance expenses are potentially available.

b) Alarm Rationalization - A significant shortcoming of most existing "Status Monitoring" Systems is their propensity to overwhelm the operator with immense amounts of data; for example if a trunk amplifier fails, then it affects the transmission through all subsequent trunk amplifiers and the status monitors within each report a faulty condition. There may be as many as 60 amplifiers downstream of the faulty unit, and this represents an overwhelming amount of data being offered to the operator. The real fault gets buried. The situation is aggravated with an intermittent fault. It is because of this shortcoming that Status Monitoring has, until now, been considered a very marginal tool for assisting operations and has not gained popularity. The new Network Management System, through software intelligence and interaction with the computer aided design network map database, filters out the excess data and presents the operator only the pinpointed fault.

This is a practical, useable, alarm display which will allow efficient responsiveness, appropriately directed maintenance and repair, and improved transmission reliability. Reduced operating expenses and a greater level of customer service will result.

c) Automatic Diagnostics - This application combines the rationalized monitoring function with intelligent software, and through automatic interaction with the digitized network maps and equipment inventories, provides problem diagnosis in plain working English User-friendly network monitoring minimizes the time to isolate a problem, eliminates incorrect judgments on the source of the problem, and minimizes network down time.

d) Automatic Circuit Restoral - The various monitoring applications pinpoint the faulty portion of the signal processing equipment or distribution network. Command and switching signals are automatically generated through the application of additional diagnostics and software intelligence. These commands

invoke a number of automatic functions:

1) Switches in an alternative transmission route if part of the fibre, microwave or coaxial trunking network become faulty.

2) Switches in an alternative signal source if severe reception difficulties are encountered on TV and broadcast radio signals.

3) Switches in back-up RF, video or optoelectronic equipment should any channel processing modulator, demodulator or data equipment fail.

The switching process is either totally automatic or is a two step process where a prompt message is sent to the Technical Action Centre (TAC). The message describes the problem and instructs which switch should be activated. This option enables the TAC personnel to ignore switching commands that may have resulted from deliberate maintenance activities on the network or rearrangement of equipment.

Automatic Circuit Restoral minimizes down time and interruption of service. It operates 24 hours per day without the need for dedicated switching personnel and minimizes the chance for incorrect switching.

e) Assisted Repair - This enhancement builds on the strengths of the monitoring and diagnostic applications previously discussed. When a technician is dispatched to correct a fault, the mobile data terminal assists the technician by displaying the nature of the fault and its precise location. It also provides information on the most likely corrective action to take while executing the repair. Once the repair is completed the technician is prompted to either confirm the remedy was correct or provide additional information through the terminal key pad on what action was necessary. The database accepts this new information and updates its rule base on appropriate corrective action.

In its more advanced form this service aid not only provides expert advice on the likely cause and corrective action for the reported problem but on request it walks technicians through more difficult diagnosis and automatically provides further information on appropriate corrective actions. Through successive usage and updates, the technical service aid delivers recommendations with a greater likelihood of being correct.

The most significant benefit is that the level of training of field personnel can be quite modest yet the personnel will be able to handle a diversity of equipment types and technical problems. Furthermore, the automatic guidance in problem correction will significantly speed up the repair process and minimize down time. An overall reduction in repair staff expenses should result.

f) Automatic Issue of Trouble Tickets - The monitoring, VRU and diagnostics applications previously discussed provide all of the contents necessary to issue a trouble ticket. This application collects together this information and determines to which group or specific person the compiled ticket should be passed.

Prompt and more accurate trouble

tickets, will result in more efficient utilization of personnel provides a higher level of customer service.

g) Automatic Dispatching - The previous application automatically compiled the trouble ticket. This application automatically issues the trouble ticket to field personnel through various dispatching channels

1) Digital Dispatching directly to the truck or portable terminal, or
2) Dispatching to the field personnel via a pager, or
3) Automatic telephone call to a technician on standby with the VRU providing specifics of the trouble ticket or work order.

An enhancement to this application utilizes the physical plant and geographic database information to pinpoint the most recent known location of field personnel. The skill sets of each technician are automatically assessed through interaction with the human resource data base and the technician with the appropriate skills located closest to the trouble is automatically dispatched.

Prompt and more accurate dispatching of field personnel provides for more efficient utilization of staff. It also minimizes non-productive driving time and is particularly valuable in the dispatching of specialist technicians for business customers.

h) Alert and Advisory Screens for CSR/TSR - The diagnostic knowledge and intelligence of many of the above applications results in valuable information that needs to be known by CSR's/TSR's as they interface with the customers. In this application information associated with the geographic location of the calling customer automatically appears on the help screen as the customer call is accepted or as the customers file is retrieved from the database. Additional information from this enhancement includes graphic displays of the customer areas affected and identification of the boundary streets. It also provides the local weather conditions by accessing the local Environment Canada Data Base. This enables the CSR/TSR to provide a more personal local focus with the customer although the CSR/TSR might be located hundreds of miles away.

These customized screens provide a higher level of customer service, more accurate interpretation of a customer's problem, and minimize inaccurate information being given to customers in a Regional Service Office.

i) Automatic Alert to Business Customers - In the telecommunications competitive environment it is becoming more and more important that the customer be immediately advised if a transmission problem is developing and if failure occurs. It is also important to provide the customer progress results on the restoration status. Furthermore, the sophisticated customer who perceives they have a problem with the network needs to know the status of their particular circuits to facilitate their own diagnostics. This enhancement to the previous application extends certain monitoring, configuration and help screens to the customer and provides the necessary level of customer service to remain competitive in the telecommunications environment.

j) Graphical Information in Vehicles -This application makes use of the Digital Dispatching telecommunications channel and terminal equipment to provide the field technician access to the physical plant data at a macro level. It provides access to the CAD plant maps and on the micro level it provides the technician with both graphical and text information on the electronic and electro-optic equipment at hubs along with detail on fibre allocations, maintenance responsibilities and restoration procedures. Additional vehicle equipment such as a higher resolution terminal screen and hard copy printer are necessary for the technician to use this application.

This application will eliminate the massive amounts of paper maps in the truck and totally up-to-date information available for the technicians at any time, and it will also result in more rapid and accurate equipment replacement, repair or fibre restoration during transmission malfunctions. On-line feed-back ensures the physical database is continually updated as field personnel uncover inconsistencies between the physical plant in place and the database records and enter corrections through their terminals.

k) Automatic Collection of Statistics - Statistics related to the reasons for technical service visits, equipment failures and the number and frequency of transmission interruptions are very questionable in their accuracy at best when gathered manually. Many outages for instance go unrecorded. This application collects together all of the automatic monitoring, dispatching, diagnostics, data and arranges it into statistical records for use by the Management Information System.

It provides usable accurate data for measuring levels of service and efficiency in the utilization of staff. It provides objective information for future planning and technical upgrading of the network or rearrangement of equipment. Also, measured transmission performance satisfies business customers that the contractual obligations have been met.

l) Automatic Customer Advisory on Receipt of Trouble Call – On receipt of a trouble call the VRU offers touch-tone equipped customers four inquiry options:

1) Total Loss of Cable TV Service
2) Loss of Only Pay TV Services
3) Other Reception Problems
4) Stay on the Line for a Technical Service Representative

For options 1) - 3) Automatic Number Identification (ANI) has already indicated the customers home phone number and the VRU advises whether the problem is known to exist in that customer's area, the actual nature of the problem, and the status of correction progress. If the VRU itself has not been advised that a problem exists, then it immediately routes the customer to a Technical Service Representative, and simultaneously posts an alert to the Network Management System. This in turn awaits further postings to determine whether the problem may have been unique to that customer. Then once it has been cleared, the VRU would phone back the registered home telephone number and ask the customer whether they are satisfied that the problem has been resolved and to invite the customer to signify this by hanging up the phone or

to stay on the line for help by a Technical Service Representative.

This system provides an improved level of customer service while presenting less calls to technical service representatives, hence enabling a lower level of TSR staffing for a given telephone service quality level.

m) Post-ServiceSatisfaction Calls - At a predetermined time, after any installation or service visit, the customer is called by the VRU and their satisfaction with the recent visit verified. A satisfied customer is prompted to hang up the phone; an unsatisfied customer is invited to stay on the line and is routed to a Technical Service Representative. These calls are orchestrated with predictive dialler equipment keyed to the availability of the existing TSR pool and the incoming customer call load on the telephone lines.

This provides a vehicle for customers to advise of dissatisfaction or satisfaction, provides feed-back on the quality of service being provided, and provides the above benefits without additional Technical Service Representatives.

n) Digital Dispatch Call-Ahead to Customers - This application is available to those operations employing digital dispatching of their service vehicles. Upon leaving one customer and travelling to the next, the technician presses the "Call-Ahead" key on the vehicle terminal. The digital dispatching system instructs the VRU to phone the customer in conjunction with the predictive dialler equipment as in the above application. If the call is not answered by the customer, the visit is automatically cancelled and placed for rescheduling. The technician meanwhile proceeds to the next scheduled visit. If the call is answered, the VRU asks the customer to accept the appointment by hanging up the phone, or staying on the line to advise a Technical Service Representative for a change in the appointment. The VRU also invites customers with a touch-tone phone to press the #1 key on telephone if the reason for the service is no longer required.

This call-ahead alerts the customer of the imminent arrival of the technician so that they may prepare themselves and not be inconvenienced.

It also saves non-productive truck visits if the customer is unavailable or the reason for the visit no longer needs attention, and provides a much more efficient utilization of field technician time.

o) Elimination of the Need for Touch-Tone Responses - True Voice Recognition technology is becoming well advanced. The accuracy of identifying simple spoken commands such as 0-9, yes or no, etc. in thousands of different dialects is now very high, and the equipment is becoming fairly inexpensive. Substituting the spoken word in place of touching the telephone keypad on a prompt from the VRU substantially simplifies many of the above applications, and makes them accessible to all of the customers.

This is very customer friendly, and enhances the effectiveness of many VRU prompted applications.

SUMMARY

The Rogers Advanced Customer Environment (RACE) is being developed to provide a quantum improvement in the level of service offered to our cable TV subscribers and business customers. RACE is a valuable tool to offset the problems of growing complexity of coaxial, fiber optic and microwave networks, the demands for better customer service, and the scarcity of qualified staff.

The Network Management System has been highlighted as the key element in providing exceptional customer service. However, in itself, Network Management will not provide all of the facilities necessary to meet the customer service goals. Heavy reliance is also placed upon the integration of the Network Management System with the Customer data base, the plant data base (CADD), telephone technology such as advanced switches and voice response units (VRU), as well as digital dispatching to mobile data terminals in the service vehicles. This integration of the technologies leverages substantial additional benefits and value out of previously isolated systems. The examples and applications presented in this paper are all feasible using this approach and a number of them are currently under development.

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CURRICULUM VITAE

NICK F. HAMILTON-PIERCY, P. ENG.

Nick Hamilton-Piercy is the Vice-President, Engineering and Technical Services for Rogers Cablesystems, his duties include managing the corporate engineering group, Rogers Engineering, as well as being responsible for the engineering and capital programs within the Company operating systems. Nick has been with Rogers for 15 years.

Prior to this, Nick was with the Canadian Marconi Company where he managed an analogue and R. F. engineering department responsible for the design development and manufacture of a wide range of telecommunications equipment including microwave radio systems, multi-channel UHF tactical relay systems and microwave R.F. hardware.

Nick graduated in Engineering from the Medway College of Technology in Chatham, England, during 1961 where he specialized in electrical engineering and qualified for full Chartered Engineering status. He is a member of the Institute of Electrical Engineers (IEE) U.K.; a member of the Association of Professional Engineers of Ontario (APEO); a Senior Member of the Institute of Electrical and Electronic Engineers (IEEE); a Senior Member of the Society of Cable Television Engineers (SCTE); Chairman - Futures Committee, Canadian Cable Television Association (CCTA); Chairman ATV Subcommittee of Cable

Television Laboratories Technical Advisory Committee, and Chairman of the National Cable Television Association Engineering Committee - HDTV Subcommittee.

JOHN C. ANDERSON, P. ENG.

John C. Anderson is currently Vice-President, Project Engineering for Rogers Engineering, the Corporate Engineering division of Rogers Cablesystems. In this role he is responsible for a number of corporate projects which are targeted towards improving customer service. Since joining Rogers in 1981, he has held a number of Engineering positions, most recently as Vice-President Engineering for Rogers Cable TV - Toronto. Prior to joining Rogers, John spent three years with Maclean-Hunter Cable TV in various engineering roles and two years with the Jerrold Division of General Instrument.

John is a graduate of the University of Waterloo with a B.A.S.c in Electrical Engineering. He is a registered Professional Engineer in the Province of Ontario (APEO).