



First (1998) NEBS compliant production installation of the Automated Call Center, providing Directory Assistance to over 1 million Bronx, NY, telephone subscribers, in a downstate New York switching center, in its own room with dedicated -48VDC power, alarms and A/C.

AUTOMATED FUNCTIONS NODE

The Bell Atlantic AFN is a network based automated call handling platform that was designed specifically to allow large volume call processing. The AFN handles calls based on both voice and key input, and utilizes the same speech and voice recognition platform found in the Bell Atlantic Speech Platform (NSP).

The AFN is a modular and scaleable platform, customized for each individual application. In its base configuration, call handling and -processing capability begins at 2,800 calls per hour, based on an average 20 second holding / processing time, using the Bell Atlantic OSDI Operator Workstation as the (optional) operator interface, and the Nortel TOPS / OPP protocol on a DMS 200 as the (optional) public switch interface. The AFN is not limited to working with the Bell Atlantic Workstation or the Nortel DMS switch, however, but can be adapted to other workstation / switch environments. In fully automated applications, no workstation interface is required at all, while a host controlled switching platform is incorporated in the AFN, providing the ability to create completely *switchless* applications.

History

In the late 1980's, when NYNEX first felt the need to create voice and speech recognition based automated call handling platforms, NYNEX Science & Technology was given the charge to develop network based solutions. The primary purpose of this research was to ensure that many automated applications could run within a

large (Bell Atlantic covers most of the Northeastern United States) and heavily populated area, without significantly impacting switch processing.

From this research, three platforms resulted, all of which are in commercial use today:

- the Bell Atlantic Speech Platform
- the Bell Atlantic Automated Functions Node
- the Bell Atlantic Multi Functional Operator Workstation



Perhaps unique in today's call handling and call processing arena, the Automated Functions Node utilizes the same core programming code, and the same programming language, used by the Operator Workstation. As a consequence, the Automated Functions Node provides much more than just call handling capability:

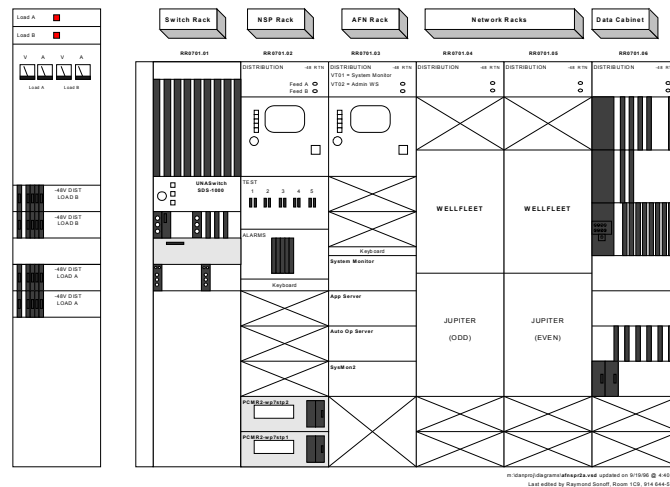
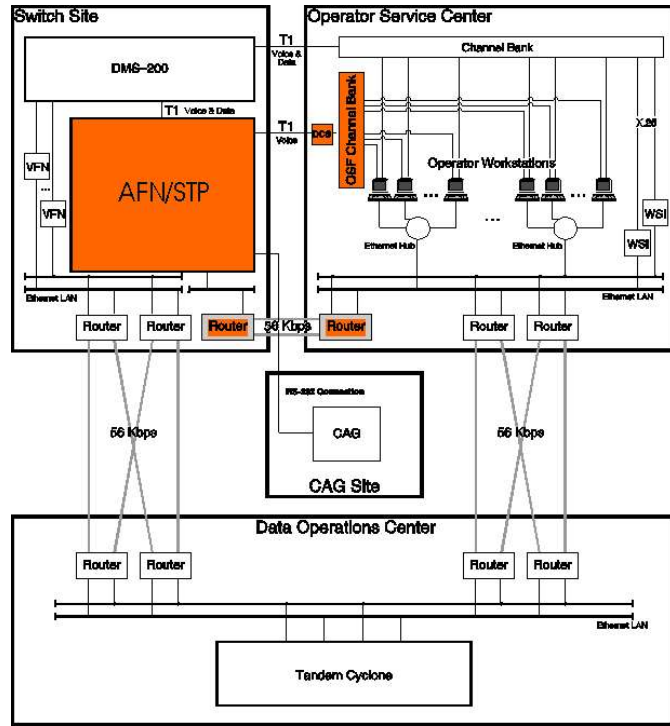
THE BELL ATLANTIC AUTOMATED FUNCTIONS NODE PROVIDES SEAMLESS INTEGRATION OF A CALL HANDLING PLATFORM INTO AN EXISTING SWITCHING ENVIRONMENT.

In situations where switching is already available, be this in a telephone or mobile network, or a PBX / PABX environment, the AFN can be installed as an Operator Services or Customer Service Center, looking to the network and to the network management environment like an additional operator bureau. There is no requirement for customization of either the switching or network management environment.

The Team

Needless to say, developing and building an automated platform is one thing, commercializing it quite another. For the productization and commercialization of the Automated Functions Node, Bell Atlantic Science & Technology has again turned to Tandem Computers Inc., which brings its worldwide integration and hardware design expertise to the software excellence available within the Bell Atlantic Advanced Technology Development division.

The Bell Atlantic / Tandem team is unique in the world of call handling system development, as Bell Atlantic understands as no other platform and services provider what the requirements of large volume switching environments are. We provide, amongst others, telephone network services to the area with the largest call volume in the world, the square mile of Manhattan real estate known as Wall Street.





System Specifications

The Automated Functions Node provides an application development platform comprised of the following functionalities and features:

- network based (telco style) alarming
- multiple application capability
- open architecture
- NEBS compliance (switch floor ready)
- statistics server
- T1, E1 and X.25 interfaces
- Ethernet (IEEE 802.3) compliance
- SNMP
- network routing
- LIDB interface
- internal database capability
- fault resilience (fault tolerance where the switching environment allows it)
- host / remote processing
- service creation administrative front end
- rapid prototyping

Application Development and Availability

Building on a core of *automated attendants*, application development on the AFN is rapid and the ability to incorporate new protocols makes the platform extremely flexible. AFN protocol development evolved around the “peripheral server” concept, in which the conversion of a customer-mandated or site specific protocol into AFN protocols is provided by a software module, which obviates the need for any change in drivers or application

code. In this manner, the AFN is able to communicate with just about any peripheral in existence, provided the protocol documentation can be made available to the software development team.

Typically, the development of a particular peripheral server is done in under a month, inclusive of unit testing - for many industry standard protocols, peripheral servers have already been implemented.

A number of call handling and call routing applications have been developed, either for the market or for trial. A sampling:

- Voice Operated Intercept System
- Operator Store and Forward
- Personal Response System
- Customer Call Completion
- DA Non Published Private Messaging

Voice Operated Intercept System

This application sits in a telephone network, receiving calls that are routed to non-existent numbers. The application queries the customer as to their original destination, allowing both DTMF or spoken digits, does a database lookup to verify that the number actually exists, and if a match is found, completes the call to that number. If no match is found, the application connects the customer to a Customer Service Agent, so an attempt can be made to verify the customer information.

Operator Store and Forward

This application front-ends the Operator, or Customer Service Agent, in a Directory Assistance environment. The application answers the customer call, queries the customer as to the information they desire, digitally records the customer’s utterances, time-compresses the customer’s speech, and removes unwanted silences. Then, a path to an operator is requested from the switch, and finally, the cleaned-up speech is played back to the operator, who does the database lookup and hands off the customer (with all of the data just retrieved by the Operator Workstation) to a Voice Response Unit (a functionality that can equally be provided by the AFN).

Primary aim for this application is to reduce the amount of time a customer spends with the Customer Service Agent, and to assist the customer in formulating queries that can be handled rapidly and efficiently.

Under development is a methodology that allows the application to word spot the customer’s speech as it is recorded, and, if sufficient data is generated from this process, to eliminate the operator interface from the query process entirely, passing only those queries that generate insufficient data on to the human operator.

Personal Response System

This application queries the customer as to the information they require, using the Customer Service Agent’s own voice, allowing the CSA to read the information on their screen, and listen to the



customer without being distracted by having to actively interact with the customer

Customer Call Completion

This application will complete a call to the destination number as generated by the Operator Workstation, using either the PSTN, or another switch, or the switch that originally delivered the call to the AFN.

DA Non Published Private Messaging

This application provides a way to deliver a caller's voice message to a customer with an unlisted or unpublished number, making it possible to generate network traffic and revenues in a situation where the target number cannot be delivered to the caller.

It should be emphasized that the AFN is capable of migrating many features that are switch based in landline networks to mobile and PABX environments, providing an interface between:

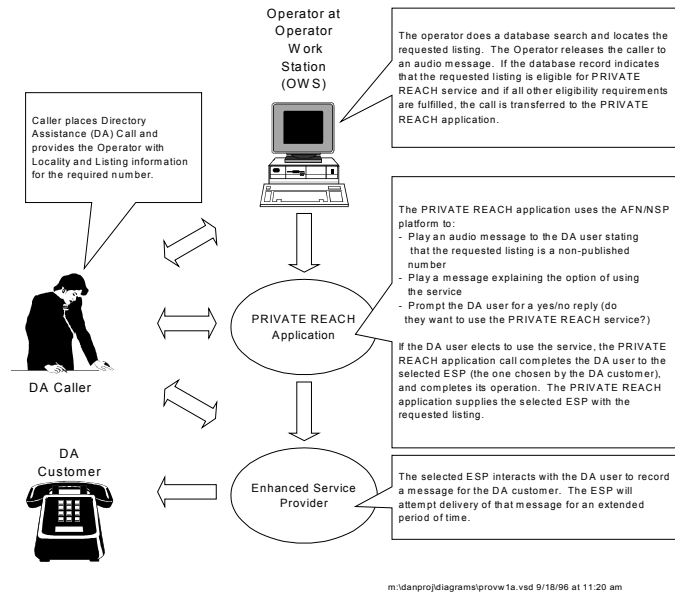
- a mobile network and the PSTN
- two or more mobile networks
- a PABX and the PSTN

- two or more PABX installations

Needless to say, the networks and/or switches do not have to be in the same city, country, or even on the same continent, and can be connected via a variety of mixed media, from T3 and E3 public facilities to private VSAT installations.

Support & Maintenance

A multi-tiered support structure has been created for the Automated Functions Node. Depending on customer requirements and the contract in place, support from both Bell Atlantic and Tandem can be anything up to on-site on a 24-by-7 basis. The Bell Atlantic / Tandem team also provides training for those customers wishing to provide their own support. Sales and technical support can be provided worldwide.



Related issued United States Patents:

- 7,606,359 (October, 2009)
- 6,480,598 (November, 2002)
- 6,188,907 (February, 2001)