file

RECEIVED
MAY 5 1994
DOCKETING DIVISION
PUBLIC UTILITIES COMMISSION OF OHIO

BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Application of The Ohio Bell Telephone Company for approval of an alternative form of regulation.	))))	Case No. 93-487-TP-ALT

SUPPLEMENTAL TESTIMONY OF LINDA S. KLAIS
AMERITECH OHIO EXHIBIT 23S.0
SUBJECT: NETWORK DEPLOYMENT

---

1. Q: WHAT IS YOUR NAME AND BUSINESS ADDRESS?

A: My name is Linda S. Klais. My business address is 65 Erieview Plaza, Cleveland Ohio.

2. Q: ARE YOU THE SAME LINDA S. KLAIS WHO FILED OHIO BELL EXHIBIT 23.0?

A: Yes, I am.

3. Q: WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A: The purpose of my testimony is to respond to some of the recommendations made in the PUCO Staff Report of Investigation and the National Regulatory Research Institute (NRRI) addendum to the Staff Report used in Case No. 93-487-TP-ALT. Specifically, my testimony will deal with the following:

a. The Staff recommendation that Ameritech Ohio, within twelve months of implementation of the Plan, initiate a trial which would explore the demand for full number portability, the technical and administrative requirements, the appropriate geographical scope and the cost and subsequently submit a report summarizing the results following eighteen months of trial experience (p. 76-77).

b. The Staff recommendation to increase efforts to build redundancy into the network as fiber optic deployment and upgrades to the infrastructure occur and to address the constraints to providing ubiquitous redundancy (p. 104).

c. To clarify Ameritech Ohio's infrastructure modernization commitments under Advantage Ohio.

4. Q: THE STAFF RECOMMENDED THAT AMERITECH OHIO CONDUCT A TRIAL OF FULL NUMBER PORTABILITY. DID THE STAFF DEFINE FULL NUMBER PORTABILITY?

A: No, the Staff didn't define number portability and it can be defined in many ways.

5. Q: WHAT IS THE DEFINITION OF NUMBER PORTABILITY THAT WILL BE USED IN YOUR TESTIMONY?

A: Number portability is the ability of customers to retain their telephone numbers when they change exchange service providers while remaining at the same geographical location.

6. Q: DO ANY FORMS OF NUMBER PORTABILITY EXIST TODAY?

A: Yes, Ameritech Ohio is able to offer some forms of

number portability to its customers today through Foreign Exchange service, Call Forwarding, Separate NXX and Dedicated Trunk Routing (DID Trunking).

7. Q: IS IT TECHNICALLY FEASIBLE TO PROVIDE FULL NUMBER PORTABILITY FOR ALL LOCAL EXCHANGE TELEPHONE NUMBERS TODAY?

A: No, neither Ameritech Ohio nor any other industry participant has been able to identify a viable method for providing full number portability.

8. Q: DO YOU BELIEVE THAT IT IS NECESSARY FOR AMERITECH OHIO TO CONDUCT A FULL NUMBER PORTABILITY TRIAL?

A: No. Ameritech Ohio believes that in order to be effective, any number portability option must not only be technically feasible but also supported by the industry. For that reason, Ameritech introduced and was joined by AT&T, MCI and Teleport in supporting a number portability project before the Industry Numbering Committee of the Alliance For Telecommunications Industry Solutions panel. The project was accepted and is progressing. I believe that the trial the Staff recommended, involving only Ameritech Ohio, should not be adopted and the existing industry work should not be duplicated.

9. Q: HAS THE STAFF MADE ANY RECOMMENDATIONS RELATING TO REDUNDANCY IN AMERITECH OHIO'S NETWORK?

A: Yes. The Staff made two recommendations regarding redundancy. First, the Staff recommended that as fiber optic deployment and upgrades of the infrastructure occur, Ameritech Ohio should increase its efforts to build redundancy into the network.

10. Q: WHAT IS THE COMPANY'S POSITION RELATING TO THIS RECOMMENDATION?

A: The Staff uses the term redundancy, but redundancy can have various meanings. For purposes of this testimony, I interpret redundancy to mean reliability.

11. Q: USING RELIABILITY AS THE BASIS FOR THE TERM REDUNDANCY, WHAT IS THE COMPANY'S POSITION?

A: It is Ameritech Ohio's position that reliability will be built into the network as fiber is deployed or as the infrastructure is upgraded. It is also the Company's position that our infrastructure commitments, under Advantage Ohio, reflect an increased effort to build reliability in the network.

12. Q: WHAT WAS THE SECOND RECOMMENDATION THE STAFF MADE REGARDING REDUNDANCY IN AMERITECH OHIO'S NETWORK?

A: The Staff recommended that Ameritech Ohio file supplemental testimony addressing the level of redundancy being incorporated in its network, and the constraints to providing ubiquitous redundancy.

13. Q: HAS AMERITECH OHIO MADE ANT RECENT EFFORTS TO IMPROVE REDUNDANCY IN THE LOCAL SWITCH PORTION OF THE NETWORK?

A: Yes, assuming once again that reliability can be equated to redundancy. One significant design philosophy, inherent to stored program control (SPC) switches, is that system units, whose failure would substantially jeopardize service continuity, are fully duplicated. Ameritech Ohio first introduced SPC technology as an ESS switch in 1967; the last non-SPC switch was replaced in 1990 with a digital switch. Thus, during this period as we deployed SPC switches in 100% of our central offices, reliability also increased significantly.

14. Q: PLEASE DESCRIBE THE NATURE OF THE DUPLICATION PROVIDED IN THE LOCAL SWITCH ARCHITECTURE.

A: Major hardware units like central processors, peripheral processors, networks, data buses, control links, timing links, and power converters are fully duplicated and typically operate in active/standby or active/active configurations. This hardware duplication is augmented by extensive software maintenance routines that perform audits and integrity checks designed to detect faults and remove defective equipment from service.

15. Q: WHAT CURRENT STANDARDS DESCRIBE THE RELIABILITY CRITERIA THAT YOUR VENDORS MUST MEET?

A: Currently, the LATA Switching Systems Generic Requirements (LSSGR) document, published by Bell Communications Research, Inc. (BellCore) specifies generic requirements and objectives for switching systems. The first objective is that no single hardware fault should be able to cause a major loss of system call processing capability. The second objective is that single hardware faults should not cause a loss of service to groups of more than 64 switching system network terminations (e.g., lines or trunks).

16. Q: WHAT IS THE CURRENT LEVEL OF SWITCH RELIABILITY FOR AMERITECH OHIO?

A: Since 100% of our switches are stored program controlled, we are at the maximum level of switch reliability given this technology.

17. Q: WHAT HAS AMERITECH OHIO DONE TO IMPROVE RELIABILITY IN THE INTEROFFICE PORTION OF THE NETWORK?

A: I have previously testified that fiber optic systems deployed in the interoffice network were designed with a working channel and a protection channel. Four fibers are used, two for the working channel and two for the protection channel. If there is a failure of the working channel fibers, then service is automatically switched to the protection channel fibers and service is maintained.

This original deployment strategy provided enhanced service reliability over older technology equipment but two key failure points still remained. The first was that in most cases, the working and protection fibers were in the same cable sheath and as a result, if the working fiber failed, so did the protect. The second potential problem was that traffic that extended from one fiber system to a second system remained unprotected between the systems. Late in the 1980's, as fiber deployment

had become more widespread, plans were developed and implemented to separate the working and protect fibers and route them in different cable sheaths, and where possible, in different physical paths.

18. Q: WHAT IS THE ADVANTAGE OF PROVIDING A SECOND FIBER PATH?

A: Providing a second fiber path eliminates the potential of a failure due to both working and protect fibers existing in the same cable sheath. This strategy does not, however, improve the situation where traffic is extended from one system to a second system. This problem can't be reasonably addressed with asynchronous fiber systems. SONET based fiber systems do address this problem. SONET equipment, with its inherent ring capabilities, allows the network to be designed to eliminate failures due to the loss of an equipment node. In a SONET ring, traffic that routes through a failed equipment node is automatically routed in the opposite direction to avoid the node during the node failure.

19. Q: HAS AMERITECH OHIO DEPLOYED ANY SONET EQUIPMENT IN THE INTEROFFICE NETWORK?

A: Yes. Ameritech Ohio began deploying SONET equipment in 1993 with the first application being a large outstate route that extends from Toledo-Findlay-Fostoria-Tiffin-Freemont-Toledo. Since then, other SONET systems have been deployed and SONET equipment has become the system of choice for Ameritech Ohio.

20. Q: THE STAFF IS CONCERNED THAT WITHOUT A RELIABLE NETWORK, SOME COMMUNITIES MAY BE UNABLE TO CALL EMERGENCY SERVICES SUCH AS 911. IS THE COMPANY DOING ANYTHING THAT SHOULD REDUCE THEIR CONCERN?

A: Yes. We will continue to deploy fiber based SONET systems in the interoffice network and if Advantage Ohio is approved, there will be very few routes, if any, carrying 911 calls that are unprotected.

21. Q: WHAT HAS AMERITECH OHIO DONE TO INCREASE RELIABILITY IN THE LOCAL LOOP?

A: Beginning in 1982, Ameritech Ohio began deploying digital loop carrier systems in the feeder portion of the local loop. Digital loop carrier systems are pair gain devices which provide for up to 96 subscriber channels between a central office terminal and a remote terminal. The 96 channels are

converted into DS1 signals and are transported over four T1 digital lines.

In addition to the four working T1 lines, an optional protection T1 line can be provided for each system. The protection T1 line is automatically switched in if a working T1 line fails. Although the protection T1 line is optional, Ameritech Ohio's policy has been to provide the T1 protect line for all of its copper based digital loop carrier systems.

In 1985, Ameritech Ohio began deploying fiber based digital loop carrier systems in the feeder portion of the loop network. Original fiber based digital loop carrier systems were essentially the same as the copper based systems with only the transport medium being different. Rather than requiring four T1 digital lines, these systems require two working fibers.

In addition to the two working fibers, provision is made for an optional protection line requiring two more fibers. Again, Ameritech Ohio's policy has been to provide two protect fibers for all fiber based digital loop carrier systems.

Another way in which we have increased the level of reliability is by deploying fiber rings in the loop network. Fiber ring architecture calls for the placement of two fiber cables. Cable one, the main or working fibers, originating at the serving wire center, passes in front of customer locations and terminates in Ameritech Ohio controlled space that's designated as a splice hub. Cable two, the protection fibers, starts at the splice hub and transverses the shortest possible, but different, cable route back to the serving wire center. Asynchronous lightguide equipment, used on these rings, utilized four fibers; one pair for transmission, and another pair for optional, backup service protection. When used with ring cables, the transmission fibers utilized are in cable one from the wire center and the protect side of the equipment is routed to the splice hub. At the splice hub, the protect fibers from the customer location are connected to cable two, returning to the serving wire center via a different route. With this arrangement, if cable one is cut, the equipment automatically switches to the protect fibers and no interruption in service occurs.

22. Q: WHEN DID AMERITECH OHIO BEGIN DEPLOYING FIBER RINGS IN THE LOOP?

A: The first fiber ring was deployed in 1989.

23. Q: DO FIBER RINGS OFFER ANY OTHER FORM OF RELIABILITY?

A: Yes. Fiber rings with splice hubs offer another option which improves reliability for non-switched special services which originate or terminate at other than the serving wire center. This option is called Wire Center Avoidance. In this option, a fiber cable is placed from the splice hub to the originating/terminating wire center via a route which avoids passing through the serving wire center. The protect side of the equipment at the customer location is still routed to the splice hub. At the hub, however, the protection fibers are connected to the fiber cable going directly to the originating/terminating wire center. In this configuration, an equipment failure in the serving wire center would cause the equipment at the customer location to switch to the protect fibers to the originating/terminating wire center via the splice hub, with no interruption of service.

24. Q: IS THERE ANYTHING ELSE THAT AMERITECH OHIO IS DOING TO INCREASE RELIABILITY IN THE LOCAL LOOP?

A: Yes. In 1992 Ameritech Ohio began deploying Next

Generation Digital Loop Carrier (NGDLC) which is SONET based and will increase reliability.

25. Q: ARE THERE ANY OTHER STEPS THAT AMERITECH OHIO COULD TAKE TO INCREASE ITS EFFORTS TO BUILD RELIABILITY INTO THE NETWORK?

A: I don't believe there are. We are already using and deploying the latest technologies available.

26. Q: WHAT DOES UBIQUITOUS NETWORK REDUNDANCY, OR RELIABILITY, MEAN TO YOU?

A: I would define ubiquitous network reliability as meaning that every network element would be backed up or protected so that a service outage could never occur.

27. Q: WHAT CONSTRAINTS EXIST TO PROVIDING UBIQUITOUS RELIABILITY IN THE NETWORK?

A: The first and most obvious is cost. Using the loop portion of the network as an example, just to deploy enough digital loop carrier systems to serve all of our access lines could cost over 2 billion dollars. Even if we deployed these systems, we would only be increasing reliability in the feeder

portion of the loop.

The second constraint is technology. Even if redundancy was provided all the way to the customer premise, most customer premise equipment could not take advantage of it. As a result, the Staff recommendation concerning reliability is being met by Ameritech Ohio. No further steps are appropriate to respond to the recommendation.

28. Q: IN ITS REPORT THE STAFF RECOMMENDED THAT $382.2 MILLION TO $476.2 MILLION BE IDENTIFIED AS AN INFRASTRUCTURE INVESTMENT COMMITMENT IN ANY PLAN APPROVED FOR AMERITECH OHIO. IS AMERITECH OHIO COMMITTING TO SPEND ANY FIXED DOLLAR AMOUNT FOR THE SPECIFIC INFRASTRUCTURE PROJECTS IDENTIFIED IN YOUR ORIGINAL TESTIMONY?

A: No. Ameritech Ohio is committing to deploy technology; digital switching, SS7, interoffice fiber, ISDN, and fiber to schools, libraries, hospitals, courthouses and jails. The cost to deploy this technology has been estimated at $476.2 million; it may cost more, or it may cost less. If Advantage Ohio is approved, we are committed to deploying the technology regardless of the actual cost.

29. Q: THE STAFF REPORT REFERS TO THE COMPLETION OF THE INFRASTRUCTURE MODERNIZATION COMMITMENTS BY THE END OF 1998 OR JANUARY 1, 1999. IS THIS DATE CORRECT?

A: The completion of the commitments will be within five years of the approval of Advantage Ohio. The end of 1998 completion date, that was referred to in my original testimony, assumed a January 1, 1994 approval date for Advantage Ohio.

30. Q: DOES THIS CONCLUDE YOUR TESTIMONY?

A: Yes.