

To: Distribution
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Subject: Multics Remote Concentrator

INTRODUCTION

The present need for a terminal concentrator as an integral part of the Multics product is clear. The following arguments are cited to underline this need:

- a) as the Multics customer base is broadened to embrace new customers and new applications, the pressure for a concentrator capability will increase.
- b) such a capability, or the promise of one, could aid the sales effort.
- c) current and near-term customers desire a concentrator capability -
 - o USL would like to concentrate five low-speed terminals and a remote printer situated at Lake Charles, La. to their Multics system.
 - o USGS states the need to concentrate 16 low-speed terminals from a remote site to their Denver Multics system.
- d) the connectibility of terminals is enhanced with a concentrator capability - possibly in the number of terminals, certainly in their geographical dispersion.

This MTB recommends a specific phased approach to adding the concentrator function to Multics. The Multics Remote Concentrator (MRC) will be based on a Level 6 system that is connected to the Multics front-end processor via synchronous high-speed links.

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Both the Honeywell RNP700 and Level 6 systems were studied as vehicles for implementing a Multics remote concentrator. Level 6 was chosen over RNP700 because the manpower resources required to adapt the RNP700 software was estimated to be about the same as starting with basic Level 6 software and building a concentrator package from the ground up. In addition, the Level 6 based concentrator will be fully integrated into the Multics product.

MRC FUNCTIONALITY

The general functions performed by the MRC are given below. The initial release will support a sub-set of these items as described in a later section.

- a) support attachment of many asynchronous low-speed terminals via dial-up or dedicated lines.
- b) connect to Multics over synchronous high speed links via dedicated lines.
- c) perform concentration (multiplexing) of terminal to Multics message traffic.
- d) perform de-concentration (demultiplexing) of Multics to terminal message traffic.
- e) provide a terminal interface that is compatible with the current Multics terminal interface. A primary design goal is to make the concentrator function transparent to the terminal user.
- f) operate as a stand-alone, unattended unit. The MRC will be able to automatically reboot after a power failure and restart without intervention by an operator, without the Multics system being operational.
- g) support attachment of available Level 6 peripherals that are judged desirable additions to the concentrator function. In particular, a line printer and card reader will be supported as devices that can be "addressed" by the Multics system via the high speed links. This additional message traffic will be handled in concert with usual terminal traffic.

IMPLEMENTATION PLAN

The MRC will be implemented in three phases.

- a) Phase 1 - effort in MCS/355 software area
 - o implement full IBM Binary Synchronous interface at the physical level - this includes ASCII and EBCDIC code, transparent and non-transparent modes.
- b) Phase 2 - effort in ring-0 modules
 - o recognition of concentrator lines configured in the front-end processor

- o specification of a message format that supports concentration of traffic for many terminals onto one communications line.
 - o de-concentration of terminal input messages and routing them to appropriate Multics processes (via `tty_read_`).
 - o concentration of process output messages (via `tty_write_`) into formats suitable for transfer to concentrator lines.
- c) Phase 3 - effort in Level 6 software area.
- o build a remote concentrator function around available Level 6 software modules - basic executive functions, communications interface for binary synchronous link, and diskette oriented automatic reboot.
 - o adapt current MCS terminal control tables, where appropriate, as an integral part of MRC function.
 - o concentration of terminal input message and card images into formats that are compatible with phase 2 specification.
 - o de-concentration of Multics output messages to appropriate terminals and line printer.
 - o support the use of control messages from Multics to reflect terminal interface modes and to activate line printer and card reader

PHASE 1 DESIGN GOALS

- o support of IBM Binary Synchronous line discipline at speeds of 2400, 4800 and 9600 baud.
- o support of IBM 2780 type terminals
- o support of Tymshare's TYMNET Host to Node line discipline (allows concentration of certain low speed terminals).
- o support of concentrator links to MRC (Phase 3).

PHASE 2 DESIGN GOALS

- o support of Tymshare's TYMNET Host to Node message formats
- o support of MRC (Phase 3) message formats

PHASE 3 DESIGN GOALS

- o support of one concentrator link to Multics at speeds of 2400, 4800 and 9600 baud.
- o support of low-speed asynchronous terminals at speeds of 110, 134.5, 150, 300 and 1200 baud.
- o concentration of greater than 14 low speed terminals.
- o support of one line printer and one card reader as Multics remote devices.
- o complete transparency of concentrator function in terminal and user interface
- o support of all terminal types that are also supported by MCS.
- o automatic reboot after power failure restart.

PHASE 1 AND 2 HARDWARE

n HSLA Binary Synchronous subchannels

PHASE 3 HARDWARE

The following configuration will be supported by MRC at its initial release -

1	Model 100 Central Processor
16K	Words of Memory
1	Multiple device controller
1	Line Printer
1	Card Reader
1	Diskette Drive
1	Teletype Console
2	Multiline Communications Controllers
1	Communications Line Adapter - Synchronous
7	Communications Line Adapters - Asynchronous

Additional memory, communications controllers, and asynchronous adapters may be supported as the number of terminals that can be concentrated increases. The above configuration is for the minimum of 14.

FUTURE ENHANCEMENTS

Following release of MRC (Phase 3) certain extensions and enhancements will be considered -

- o HDLC link between Multics and MRC

- o multiple links between Multics and MRC
- o increase the number and types of terminals that can be concentrated
- o concentration of poll/select lines.

Please address comments on this MTB to Mike Grady.