



### **ARA02 : Error correction and modem scripting**

See also :     Apple Remote Access Modem Scripting Guide  
                  Apple Remote Access Personal Server for Macintosh User's Guide  
                  Apple Remote Access Client for Macintosh User's Guide  
                  Apple Remote Access MultiPort Server for Macintosh Administrator's Guide

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This document discusses error control and data compression when using Apple Remote Access (ARA). Specifically, it details ARA's use with modems that support error control using CCITT V.42 as well as data compression using CCITT V.42bis. Regardless of which error control and/or compression protocols your modem supports, please refer to the manufacturer's documentation for more information on their availability and use.

#### **Why use error control or data compression?**

Numerous modem manufacturers are now supplying error control and/or data compression as a method of assuring accurate and efficient communication between a pair of modems, even under less than optimal line conditions. Typically, these options are enabled via Hayes-compatible "AT" commands prior to dialing a number or readying a modem to answer calls and are employed whenever the overlying application does not support error correction and/or data compression.

#### **ARA's use of error control and data compression**

ARA implements V.42 error correction (MNP 4) from its' Client application to its' Server application, as the Mac Serial Port is judged to be unreliable. ARA implements V.42bis data compression (LZW) from its' Client application to its' Server application. Thus it is not necessary to enable these features on the modem (except for cellular data modems, which are discussed below). Modem scripts, as distributed by Apple and by cooperating modem vendors, should specifically disable these features to ensure the best possible performance. ARA data compression is more effective than what is implemented in modems, simply due to greater computational power available.

If you plan to write or customize a modem script, it is recommended that you do not use the error correction or data compression capabilities of your modem without testing it with varying line quality, file type, and file size to see if the desired performance improvement has been achieved.

#### **And what if data compression and/or error correction are used with ARA?**

Some customers, with exceptionally noisy phone lines, have reported that enabling the primary V.42 error correction standard (LAP-M) from modem to modem, has given them

improved connection reliability. Note that ARA still does MNP 4 error correction end to end, due to the unreliability of the Mac Serial Port. If you have this need, please consult your modem manual carefully, and note the use of USERHOOK 2 in the Modem Scripting Guide. This call alerts ARA that the modems have successfully negotiated a V.42 link, and ARA should relax its retransmit timers. Failure to call USERHOOK 2 could result in unnecessary timeouts, re-transmissions, and the connection being dropped. There is no method for turning off ARA V.42.

Some customers have expressed a desire to implement V.42bis data compression (or perhaps MNP 5) from modem to modem. Generally this hurts throughput, but if you have this desire, please consult your modem manual carefully, and note the use of USERHOOK 3 in the Modem Scripting Guide. This call alerts ARA that the modems have successfully negotiated a data compression link, and ARA should turn off its own data compression. Failure to call USERHOOK 3 could result in performance losses, as ARA will be trying to compress already compressed data.

### **What's with the 'mlts' resource and varString 4?**

During the development of ARA 2.0, we included the infrastructure for requesting that modems bring up an error correction link. VarString 4 was selected as the variable that would be set to indicate what type of error correction link was requested. The 'mlts' resource was selected as the way that the modem script writer could inform the CCL engine, that the modem had the capability to perform error correction. VarString 4 is controlled by an algorithm in the CCL engine. In future versions of ARA, the CCL engine may choose which modem script to use, based on values in the 'mlts' resource. Currently for the Personal Client/Server products, varString 4 = 0, unless the MNP 10 box is checked, in which case varString 4 = 2. Currently for the MultiPort Server product, varString 4 = 0. Setting 'mlts' byte 1 = 1 does not mandate that varString 4 be passed to the script with a value of 1. We recommend that modem script writers include 'mlts' resources and correct modem commands for varString 4 = 1, for future compatibility.

### **Using cellular modems with ARA**

If an ARA connection is desired using cellular modems, you should enable the MNP10 capability in the modems. This is performed differently depending on whether you are configuring for ARA individually (Personal Server or Client) or for use with the MultiPort Server.

- For the Personal Server or Client, open the 'Remote Access Setup' Control Panel document and check the box named 'Use MNP 10 error correction in modem'. This will tell ARA to establish a connection using MNP10 (provided that modems that support MNP10 are being used). You must use a modem script that has been properly configured to support both MNP10 and non-MNP10 modems.
- For the MultiPort Server, a check box is not used. Instead, you should configure the script to accept calls from both MNP10 and non-MNP10 modems.

### **Creating modem scripts for use with MNP10**

If you need to create or modify a modem script for use with MNP10, ensure that you perform the following:

- create an 'mlts' resource using ResEdit with byte 1 = 0x01
- Check if varstring4 is equal to '2'. If so, jump to the label that programs the modem to perform MNP-10.
- issue a 'USERHOOK 4' for a successful MNP10 connection so that anything that polls the modem will know that MNP-10 is enabled. ARA data correction can not be disabled.

Here are some excerpts from an example CCL detailing the use of MNP10 with ARA. Note that this is not a complete CCL; only the relevant parts are shown for clarity.

```

! 'mlts' resource info for this modem:
!   byte 1 == 01 -> modem HAS builtin reliability protocols
!   byte 2 == 00 -> reserved by Apple
!   byte 3 == 43 -> max hex chars in varstr 7 (72 dec)
!   byte 4 == 43 -> max hex chars in varstr 8
!   byte 5 == 43 -> max hex chars in varstr 9
...
! If modem mnp10 link requested (var 4 == 2) then jump label 4
ifstr 4 4 "2"
...
@LABEL 4
! Use this label for mnp 10 type stuff...
!
matchclr
matchstr 1 7 "OK\13\10"
! \N2 = MNP reliable mode
! )M1 = force adjust cellular power level
! *H1 = link negotiation occurs at 1200
! @M18 = use -18dBm xmit level
! -K1 = turn on LAPM to MNP10 upshift (extended services)
! :E0 = turn off equalization
write "AT\N2)M1*H1@M18-K1:E0\13"
matchread 300
...
@LABEL 32
matchclr
matchstr 29 81 "CONNECT 2400/REL - CELLULAR\13\10"
matchstr 30 82 "CONNECT 4800/REL - CELLULAR\13\10"
...
note "MNP10 reliable link established." 3
userhook 4
note "Communicating at 2400 bps." 2
CommunicatingAt 2400
jump 87
!
@LABEL 82
note "MNP10 reliable link established." 3
userhook 4
note "Communicating at 4800 bps." 2
CommunicatingAt 4800
jump 87

```

See “Apple Remote Access Modem Scripting Guide” for more information on modem scripts.