NSL
Network Note NN-6

The DECWRL Mail Gateway

Brian Reid

Issued: February, 1993

digital **Network Systems Laboratory** 250 University Avenue Palo Alto, California 94301 USA

The Network Systems Laboratory (NSL), begun in August 1989, is a research laboratory devoted to components and tools for building and managing real-world networks. Current activity is primarily focused on TCP/IP internetworks and issues of heterogeneous networks. NSL also offers training and consulting for other groups within Digital.

NSL is also a focal point for operating Digital's internal IP research network (CRAnet) and the DECWRL gateway. Ongoing experience with practical network operations provides an important basis for research on network management. NSL's involvement with network operations also provides a test bed for new tools and network components.

We publish the results of our work in a variety of journals, conferences, research reports, and notes. We also produce a number of video documents. This document is a Network Note. We use Network Notes to encompass a broad range of technical material. This includes course material, technical guidelines, example configurations, product and market position reviews, etc.

Research reports and technical notes may be ordered from us. You may mail your order to:

Technical Report Distribution
Digital Equipment Corporation
Network Systems Laboratory - WRL-1
250 University Avenue
Palo Alto, California 94301 USA

Reports and notes may also be ordered by electronic mail. Use one of the following addresses:

Digital E-net:	`DECWRL::NSL-TECHREPORTS`
Internet:	`NSL-Techreports@pa.dec.com`
UUCP:	`decwrl!nsl-techreports`

To obtain more details on ordering by electronic mail, send a message to one of these addresses with the word ‘‘`help`’’ in the Subject line; you will receive detailed instructions.

The DECWRL Mail Gateway

February, 1993

Abstract

DECWRL is a mail gateway computer operated by Digital's Network Systems Laboratory in Palo Alto, California. Its purpose is to support the interchange of electronic mail between Digital and the "outside world". Its name is derived from the organization that first operated it, Digital's Western Research Laboratory (DEC WRL).

This document describes the structure of that gateway, the instructions for using it, and details of its use from many common mail systems to which it is connected.

Network Systems Laboratory 250 University Avenue Palo Alto, California 94301 USA

INTRODUCTION

Digital Equipment Corporation operates several mail gateway computers that transport mail between Digital and external sites. The primary gateway is the DECWRL complex in Palo Alto, California, operated by Digital's Network Systems Laboratory [NSL], but there are other gateways with specific purposes in other locations. The instructions are the same for the use of all gateways.

Mail gateway computers work by having connections to several different networks, often with a different name on each network. When mail is received from one network with a destination on another network, the format of the mail is converted to match the expectations of the receiving network and the mail is re-transmitted.

Digital's mail gateway is connected to Digital's EASYnet, and also to various different outside electronic mail networks. Digital users can send outside mail by addressing their mail in care of the gateway; outside users can send mail to Digital recipients by using an address that encodes the Digital user's EASYnet address. These procedures are discussed in more detail below.

It is vitally important that Digital employees be good citizens of the networks to which we are connected. We depend on the integrity of our user community to ensure that tighter controls over the use of the gateway are not required. The most important rule is "no chain letters", but there are other rules depending on whether the connected network that you are using is commercial or non-commercial. Always use common sense.

The mail traffic volume through Digital's Internet mail gateways has approximately doubled every year since 1982. From time to time the expansion of the gateways has not kept up with the growth of the mail traffic and congestion occurs. At the time of this writing (February 1993) there are 8 computers in the DECWRL (Palo Alto gateway) complex and one each in Littleton MA, Nashua NH, Cambridge MA, and Landover MD.

ADMINISTRATION

The gateway has engineering staff, but no administrative or clerical staff. We work hard to keep it running, but we do not have the resources to answer telephone queries or provide tutorials in its use.

Often it is difficult for a user of the gateway to tell whether there is a problem with the gateway or with the network connections leading to the gateway. If you suspect that there are network problems internal to Digital you should contact Digital's Enterprise Services Center in Littleton Massachusetts, telephone 508-486-5001.

We post periodic status reports to the USENET newsgroup `dec.general`, status reports to `dec.mail.gateways`, and more technical reports to `dec.mail.config`.

If you have technical problems with the gateway, please send electronic mail to the mailing list `admin@decwrl.dec.com`, or `DECWRL::ADMIN` if you are sending from a DECNET node inside Digital.

We ask that you consider the telephone to be an instrument of desperate last resort in trying to contact us. All of the gateway staff keep unusual schedules, are not often at their desks, and when a call comes through, the secretary or guard who answers it must decide whether the call is urgent enough to have one of us tracked down or paged.

If the problem that you would like to report is that you cannot get electronic mail to `decwrl`, please try sending to the mailing list "`gw-postmisc`" at one of the other major nodes in the Palo Alto cluster. Users inside Digital please note: if you cannot reach the DECNET nodes `JOVE::gw-postmisc` or `NSL::gw-postmisc` or `DECSRC::gw-postmisc`, the problem is almost certainly not in Palo Alto, so talking to us on the phone isn't going to help solve it.

WHAT RELAY NODE TO USE WHEN SENDING FROM DIGITAL

Most of the explanations listed below refer to a DECNET node named `DECWRL::`. There are other gateway nodes available. It is *extremely* important that you not use unofficial relay nodes, even if they appear to work, because the software on those unofficial nodes is not necessarily configured to relay your message in such a way that the recipient can reply to it. When you use these unofficial relay nodes, it often results in the recipient of your message forming a poor opinion of the quality of Digital's computer network services, when in fact the problem is that you, the Digital employee, are simply using the gateway incorrectly.

Here is the complete list of official gateway nodes. Do not use any node not on this list, even if it appears to work. Future additions to this list will end in the letters "RMC" (Regional Mail Concentrator).

Node	Location	Capacity	Intended for use by
DECWRL	Palo Alto, CA	30,000	All users
CRL	Cambridge, MA	7,500	Corporate Research and DECnet area 37
DECUAC	Landover, MD	4,000	ULTRIX Resource Centers, and Sales-related use in Southeast US.
US1RMC	Littleton, MA	15,000	DECnet areas 4, 9, 12, 29, 55, 56
US2RMC	Nashua, NH	15,000	DECnet areas 2, 19
VBORMC	Valbonne, France	15,000	DECnet areas 40, 41, 43, 44, 46, 47, 48, 49, 50, 51
DECPA	Palo Alto, CA	5,000	DECnet areas 10 and 30

(Capacity numbers are in messages per day).

European users are free to use either VBORMC or DECWRL for outbound VMSmail to the Internet. US users are free to use either US1RMC, US2RMC or DECWRL for sending VMSmail to the Internet. VBORMC, US1RMC, US2RMC exchange mail with

DECWRL which remains the actual border gateway machine between Digital and the Internet. The RMCs can be thought of as internal extensions of DECWRL increasing its processing capability and moving Internet access physically closer to users.

HOW TO SEND MAIL

The DECWRL gateway complex is connected to quite a number of different mail networks. If you were logged on directly to it, you could type addresses directly, e.g.

```
To: strange!foreign!address.
```

But since you are not logged on directly to the gateway, you must send mail so that when it arrives at the gateway, it will be sent as if that address had been typed locally.

Sending from VMS

If you are a VMS user, you should use NMAIL, because VMS mail does not know how to requeue and retry mail when the network is congested or disconnected. If your VMS system has NMAIL installed then you should address your mail like this:

```
To: nm%DECWRL::"strange!foreign!address"
```

The quote characters (") are important, to make sure that VMS doesn't try to interpret *strange!foreign!address* itself. If you are typing such an address inside a mail program, it will work as advertised. If you are using DCL and typing directly to the command line, you should beware that DCL likes to remove quotes, so you will have to enclose the entire address in quotes, and then put two quotes in every place that one quote should appear in the address:

```
$ mail test.msg "nm%DECWRL::""foreign!addr""" /subj="hello"
```

Note the three quotes in a row after *foreign!addr*. The first two of them are doubled to produce a single quote in the address, and the third ends the address itself (balancing the quote in front of the nm%).

Here are some typical outgoing mail addresses as used from a VMS system:

```
To: nm%DECWRL::"ucbvax!mtxinu!rjz"
To: nm%DECWRL::"postmaster@g.gp.cs.cmu.edu"
To: nm%DECWRL::"posix!george@uunet.uu.net"
To: nm%DECWRL::"listsrv@CUNYVM.bitnet"
To: nm%DECWRL::"Bob.Jones@f654.n987.z1.fidonet.org"
```

One final note on sending from a VMS system. The VMS MAIL program contains a subcommand "set transport", which you can use to set yourself up so that all of your outgoing mail is sent with NMAIL unless you explicitly specify otherwise. To invoke it, you type this command:

```
MAIL>set transport nm%
```

Warning: if NMAIL is not installed on your system and you type this command, you will not get any error message. You should make sure NMAIL is installed (by sending a test message that has an explicit "nm%" in its address) before making it be your default transport.

Sending from ULTRIX

If your ULTRIX system has been configured for it, then you can, from your ULTRIX system, just send directly to the foreign address, and the mail software will take care of all of the gateway routing for you. Most ULTRIX systems in Corporate Research and in the Palo Alto cluster are configured this way.

To find out whether your ULTRIX system has been so configured, just try it and see what happens. If it doesn't work, you will receive notification almost instantly.

> NOTE: The ULTRIX mail system is extremely flexible; it is almost completely configurable by the customer. While this is valuable to customers, it makes it very difficult to write global instructions for the use of ULTRIX mailers, because it is possible that the local changes have produced something quite unlike the vendor-delivered mailer. One of the popular changes is to tinker with the meaning of quote characters (") in ULTRIX addresses. Some systems consider that these two addresses are the same:
>
> ```
> site1!site2!user@host.dec.com
> ```
>
> and
>
> ```
> "site1!site2!user"@host.dec.com
> ```
>
> while others are configured so that one form will work and the other will not. All of our examples use the quotes. If you have trouble getting the examples to work, please try them again without the quotes. Perhaps your ULTRIX system is interpreting the quotes differently.

If your ULTRIX system has an IP link to Palo Alto (type "`/etc/ping palo-alto.pa.dec.com`" to find out if it does), then you can route your mail to the gateway via IP. This has the advantage that your ULTRIX mail headers will reach the gateway directly, instead of being translated into DECNET mail headers and then back into ULTRIX at the other end. Do this as follows:

```
To: "alien!address"@decwrl.dec.com
```

The quotes are necessary only if the alien address contains a `!` character, but they don't hurt if you use them unnecessarily. If the alien address contains an "@" character, you will need to change it into a "%" character. For example, to send via IP to `joe@widget.org`, you should address the mail

```
To: "joe%widget.org"@decwrl.dec.com
```

If your ULTRIX system has only a DECNET link to Palo Alto, then you should address mail in much the same way that VMS users do, save that you should not put the `nm%` in front of the address:

```
To: DECWRL::"strange!foreign!address"
```

Here are some typical outgoing mail addresses as used from an ULTRIX system that has IP access. ULTRIX systems without IP access should use the same syntax as VMS users, except that the `nm%` at the front of the address should not be used.

```
To: "ucbvax!mtxinu!rjz"@decwrl.dec.com
To: "postmaster%g.gp.cs.cmu.edu"@decwrl.dec.com
To: "listsrv%CUNYVM.bitnet"@decwrl.dec.com
To: "posix!george%uunet.uu.net"@decwrl.dec.com
To: "Bob.Jones@f654.n987.z1.fidonet.org"@decwrl.dec.com
```

Sending from ALL-IN-1

Digital's internal ALL-IN-1 mail system uses MTS, the Message Transport Service, to delivery its messages. Hence an ALL-IN-1 recipient address is actually an MTS address.

The ALL-IN-1 mail system uses an address form that resembles Internet addresses. An ALL-IN-1 address takes the form

```
John Smith @LOC
```

where "LOC" is the 3-letter Digital facility location code for John Smith's place of employment. Inside Digital, the pseudo-facility "Internet" is used to specify an Internet address. For example, if you wish from ALL-IN-1 to send to the Internet address "boris@icie.msk.su", in Moscow, then address it this way:

```
To: boris@icie.msk.su @Internet
```

Sending with MTS from other systems

If the capability has been installed by system managers, then the MTS (Message Transport Service) can be used by VMSmail and ULTRIX mail users as well as by ALL-IN-1 users.

If your VMS site's system has been configured for it, then from VMSmail, the MTS address "John Smith @LOC" is typed this way:

```
To: MTS$::"LOC::John Smith"
```

If your site's ULTRIX mailer has been configured for it, then from ULTRIX mail the MTS address "John Smith @LOC" is typed this way:

```
To: John.Smith@LOC.MTS.DEC.COM
```

DETAILS OF USING OTHER NETWORKS

All of the world's computer networks are connected together, more or less, so it is hard to draw exact boundaries between them. Precisely where the Internet ends and UUCP begins is a matter of interpretation. Almost all networks now have Internet address forms, regardless of their internal addressing, so that, for example, you can reach anyplace on BITNET using an Internet address.

For purposes of sending mail, it is convenient to divide the network universe into these categories:

EASYnet	Digital's internal DECNET network. Characterized by addresses of the form `NODE::USER`. Easynet can be used for commercial purposes.
Internet	A collection of networks including Digital's IP EASYnet, the NSFnet, the Commercial Internet Exchange (CIX), and others. Most international research, development, and educational organizations are connected in some fashion to the Internet. Characterized by addresses of the form `user@site.subdomain.domain`. The NSFnet backbone and many of the NSFnet regional affiliates cannot be used for commercial purposes, but there are numerous Internet service providers offering commercial Internet services. Digital is connected to AlterNet, which is one such provider.

CSNET	The CSNET network is now part of the Internet; there is no distinction between their addresses.
UUCP	A very primitive network with no management, built largely with auto-dialers phoning one computer from another. Characterized by addresses of the form `place1!place2!user`. The UUCP network can be used for commercial purposes provided that none of the sites through which the message is routed objects to that.
USENET	Not a network at all, but a layer of software built on top of UUCP and Internet.
BITNET	Originally an IBM-based network linking primarily educational sites, BITNET is now comprised largely of VAX computers running VMS. Digital users can send to BITNET as if it were part of Internet, but BITNET users need special instructions for reversing the process. BITNET cannot be used for commercial purposes.
Fidonet	A network of personal computers. We are unsure of the status of using Fidonet for commercial purposes, nor are we sure of its efficacy. Most Fidonet computers are bulletin board systems and not mail relay systems.

DOMAINS AND DOMAIN ADDRESSING

There is a particular network called "the Internet"; it is somewhat related to what used to be "the ARPAnet". The Internet style of addressing is flexible enough that people use it for addressing other networks as well, with the result that it is quite difficult to look at an address and tell just what network it is likely to traverse. But the phrase "Internet address" does not mean "mail address of some computer on the Internet" but rather "mail address in the style used by the Internet". Terminology is even further confused because the word "address" means one thing to people who build networks and something entirely different to people who use them. In this document an "address" is something like "`reid@decwrl.dec.com`" and not "192.1.24.177" (which is what network engineers would call an "internet address").

The Internet naming scheme uses hierarchical domains, which despite their title are just a bookkeeping trick. It doesn't really matter whether you say `NODE::USER` or `USER@NODE`, but what happens when you connect two companies' networks together and they both have a node `ANCHOR`?? You must, somehow, specify which `ANCHOR` you mean. You could say `ANCHOR.DEC::USER` or `DEC.ANCHOR::USER` or `USER@ANCHOR.DEC` or `USER@DEC.ANCHOR`. The Internet convention is to say `USER@ANCHOR.DEC`, with the owner (DEC) after the name (ANCHOR).

But there could be several different organizations named `DEC`. You could have Digital Equipment Corporation or Down East College or Disabled Education Committee. The technique that the Internet scheme uses to resolve conflicts like this is to have hierarchical domains. A normal domain isn't `DEC` or `STANFORD`, but `DEC.COM` (commercial) and `STANFORD.EDU` (educational). These domains can be further divided into `ZK3.DEC.COM` or `CS.STANFORD.EDU`. This doesn't resolve conflicts completely, though: both Central Michigan University and Carnegie-Mellon University could claim to be `CMU.EDU`. The rule is that the owner of the `EDU` domain gets to decide, just as the owner of the `CMU.EDU` gets to decide whether the Electrical Engineering department or the Elementary Education department gets subdomain `EE.CMU.EDU`.

The domain scheme, while not perfect, is completely extensible. If you have two addresses that can potentially conflict, you can suffix some domain to the end of them, thereby making, say, `DECWRL.UUCP` be somehow different from `DECWRL.ENET`.

`decwrl`'s entire mail system is organized according to Internet domains, and in fact we handle all mail internally as if it were Internet mail. Incoming mail is converted into Internet mail, and then routed to the appropriate domain; if that domain requires some conversion, then the mail is converted to the requirements of the outbound domain as it passes through the gateway. For example, we put Easynet mail into the domain `ENET.DEC.COM`, and we put BITNET mail into the domain `BITNET`.

The "top-level" domains supported by the `decwrl` gateway are these:

`.EDU`	Educational institutions
`.COM`	Commercial institutions
`.GOV`	Government institutions
`.MIL`	Military institutions
`.ORG`	Various organizations
`.NET`	Network operations
`.BITNET`	BITNET and CSNET (now combined)
.??	2-character country code for routing to other countries
`.OZ`	Part of the Australian (`.AU`) name space.

2-character country codes include `UK` (United Kingdom), `FR` (France), `IT` (Italy), `CA` (Canada), `AU` (Australia), etc. These are with certain exceptions standard ISO 2-character country codes.

MAILING TO EASYNET

To mail to user `GUEST` at node `DEMO` (which is DECNET address `DEMO::GUEST`), Internet mail should be addressed to `guest@demo.enet.dec.com`. Easynet addresses are not case-dependent; `DEMO` and `demo` are the same node name and `GUEST` and `guest` are the same user name.

Sites that are not directly connected to the Internet may have difficulty with Internet addresses like `demo.enet.dec.com`. They can send into the Easynet by explicitly routing the mail through `DECWRL`. From domain-based Internet mailers, the address would be `guest%demo.enet@decwrl.dec.com`. From uucp mailers, the address would be `decwrl!demo.enet!guest`. Some Internet mailers require the form `<@decwrl.dec.com:guest@demo.enet>`. (This last form is the only technically correct form of explicit route, but very few Internet sites support it.)

The `decwrl` gateway also supports various obsolete forms of addressing that are left over from the past. In general we support obsolete address forms for two years after the change, and then remove it.

MAILING TO DIGITAL MTS USERS

Digital has a proprietary internal mail transport system called "MTS" (Message Transport Service). Its primary use is to transport mail to, from, and between users of the "ALL-IN-1" mail system. ALL-IN-1 is an integrated software package that is popular with Digital's VAX customers and is widely used by non-technical people inside Digital.

Although there is a technical distinction between an "ALL-IN-1" address and an "MTS" address, the two systems are tightly enough linked that, at least where the Internet is concerned, they can be considered to be equivalent. Certainly most users of ALL-IN-1 are unaware of the distinction between ALL-IN-1 and MTS.

ALL-IN-1 uses addresses of the form "James Guest @UCO". Here "UCO" is a Digital location code name. To route mail to such people, send to `James.Guest@UCO.MTS.DEC.COM` (Here "MTS" is the Message Transport Service mentioned above).

If your correspondent does not actually use ALL-IN-1 to read mail, then you should, if possible, avoid using MTS addresses. With few exceptions, the software that converts MTS mail into the non-MTS mail format is prone to errors and address confusion.

MAILING TO THE INTERNET

`decwrl`'s mailer is an Internet mailer, so to mail to an Internet site, just use its address. If you are having trouble determining the Internet address, you might find that the ULTRIX host table `/etc/hosts.txt` is useful. See the comments above under "how to send mail" for details about making sure that the mail program you are using has correctly interpreted an address.

MAILING TO UUCP

UUCP mail is manually routed by the sender, using `!` as the separator character. Thus, the address `xxx!yyy!zzz!user` means to dial machine `xxx` and relay to it the mail, with the destination address set to `yyy!zzz!user`. That machine in turn dials `yyy`, and the process repeats itself.

To correctly address uucp mail, you must know a working path through the uucp network. The database is sufficiently chaotic that automatic routing does not work reliably (though many sites perform automatic routing anyhow). The information about uucp connectivity is distributed in the USENET newsgroup comp.mail.maps; many sites collect this data and permit local queries of it.

If you would like to send uucp mail to some address `zzz!user` and you do not know a path, the `DECWRL` gateway will route it for you using the aforementioned public routing tables. Because the data in those tables is not reliable, we cannot offer any guarantees that the autorouting will succeed and we cannot respond to nondelivery complaints involving the autorouter. If you know a reliable route to some site it is better to use that route rather than rely on the autorouter.

Specifically, if `DECWRL` receives a uucp mail message whose first hop is to a site that `DECWRL` does not have a link to, then it will add an automatically-generated route to the front of that address. Otherwise the address that you provide will be left intact.

MAILING TO USENET

Usenet is not a network. It's a software layer, and it spans several networks. Many people say "Usenet" when they really mean uucp. You can post a message to a Usenet newsgroup by mailing it to "name.usenet" at `decwrl`. For example, mailing from VMS to this address:

```
nm%DECWRL::"rec.autos.tech.usenet"
```

causes the mail message to be posted as an article to the Usenet newsgroup `rec.autos.tech`. It is better to use Usenet software for posting articles, as more features are available that way, such as restricted distributions, crossposting, and cancellation of "wish I hadn't sent that" articles.

MAILING TO BITNET

Legend has it that the "BIT" in BITNET stands for "Because It's Time." It is a network that originally consisted primarily of IBM computers, but in recent years has been dominated by VMS VAXes. A native BITNET address is something like "`USER at MUMBLEVM`", but when translated into our Internet format it becomes `user@mumblevm.bitnet`. Once translated into Internet form, a BITNET address is used just like any other Internet address.

MAILING TO FIDONET

By comparison with the other linked networks, Fidonet has an addressing complexity bordering on the bizarre. The Fidonet people have provided us with this description:

Each Fidonet node is a member of a "network", and may have subsidiary nodes called "point nodes". A typical Fido address is "1:987/654" or "987/654"; a typical Fido "point node" address is "1:987/654.32" or "987/654.32". This is zone 1, network 987, Fido (node) 654, "point node" 32. If the zone number is missing, assume it is zone 1. The zone number must be supplied in the outgoing message.

To send a message to Bob Jones on Fidonet address 1:987/654, use the address `Bob.Jones@f654.n987.z1.fidonet.org`. To send a message to Fred Smith at Fidonet node 987/654.32, use address `Fred.Smith@p32.f654.n987.z1.fidonet.org`. Use them just like any other Internet address.

Sometimes the return addresses on messages from Fidonet will look different. You may or may not be able to reply to them.

MAILING TO MCI MAIL

MCI Mail is a commercial communication service that offers a wide range of electronic messaging services to its subscribers. To address a message to an MCI Mail subscriber, suffix "@mcimail.com" to the user name, to the 7-digit MCI ID number, or to the subscriber's registered formal name. For example, Harry Bovik could be addressed in any of the following ways:

```
123-4567@MCIMail.com
HQBovik@MCIMail.com
Harry_Bovik@MCIMail.com
```

Note that all blank spaces in the formal name must be replaced by underscores.

The most reliable delivery is by MCI ID number, and it should be used whenever it is known.

MAILING TO COMPUSERVE

CompuServe is a commercial online data service that offers an electronic mail capability in addition to its database offerings.

CompuServe subscribers are identified by a "User ID" that is two numbers separated by a comma. For example, "31416, 3601" is a CompuServe user ID. You can send mail to CompuServe customers by replacing the comma with a period and suffixing "@compuserve.com": 31416.3601@compuserve.com.

Some organizations or companies contract with CompuServe to provide a mail service for their entire organization. These are given a CompuServe "private mail area", and will typically list their addresses in the form "`organization:name`", such as "`DECCA:M.JAGGER`". To send mail to such an address, send it to "`name@organization.CompuServe.com`". For example, for the above-named user you would send to "`M.JAGGER@DECCA.CompuServe.com`".

ANSWERS TO COMMON QUESTIONS

1. **Q:** Why does it take mail so long to get through `decwrl`? My messages sometimes are delayed 3 or 4 hours, and I find this annoying.

   A: For precisely the same reason that it takes so long to get from Logan Airport to Marlboro in a car. There's a lot of mail traffic, and the networks are usually pretty congested. Decwrl handles 30,000 or more mail messages on a typical business day; the slightest hiccup in the network causes long backups. Surely you've seen the same phenomenon on a busy highway when there is an accident on the other side of the road. Everybody slows down, just a little, to take a look at the accident, and as a result there is a 10-mile traffic backup.

2. **Q:** The mail that I receive always has some junk at the end of it, with the label "Internet headers". What does this mean and how can I get rid of it?

   A: The DECNET mail protocol allows for a very limited amount of information to be sent about a mail message. It supports a "To:", a "From:", an "Subj:", and (sometimes) a "Cc:" field. Any other information must be passed as part of the message body.

   The Internet mail protocol has many more standard header fields in it, and gives users the ability to add their own header fields. Sometimes there is valuable information contained in these non-DECNET header fields, so they cannot be merely discarded. When you buy a cut-up packaged chicken at the grocery store, the giblets are usually packaged in with it, just on the off chance that you might want them. It's easy for you to throw them away, but very hard for you to recover them if somebody else has already thrown them away. Internet mail headers are not unlike giblets. If we threw them away, there is always the chance that you would come back and ask us for them, which means that we would both have to save them and also would have to answer requests for them.

3. **Q:** I use an ULTRIX system, and I find that my mail doesn't work properly for non-local recipients, especially through a mail gateway. Is there a way to fix this?

   A: The "sendmail.cf" file that is packaged with ULTRIX is very generic, and must normally be customized for any specific application. It is not particularly suitable for use inside Digital. A "sendmail.cf" file more suited to use inside Digital is available as DECUAC::/pub/sendmail-cf/*.cf*".

4. **Q:** The mail gateway sometimes muddles files that I send through it. For example, it turns copyright symbols into parentheses. Why can't this be fixed?

   A: There is no such thing as a copyright symbol in most parts of the computer network world. It's part of the DEC character set. Many other vendors don't recognize that character set, even though it is an international standard. The thing about international standards is that there are so many to choose from. The world of electronic mail networks is currently based on the 7-bit ISO 646 (ASCII) character set. There is no such character as Copyright, or Pound, or 1/2, in it. So we can't translate your use of such characters.

5. **Q:** I have real trouble sending VMS mail through `decwrl` sometimes. I get error messages like "insufficient resources at remote node" or "object not defined". Could you please fix this?

   A: Those error messages are symptoms of congestion from too many people using the network at once. To use the `decwrl` gateway effectively from VMS you must use NMAIL. NMAIL can queue and retry mail during congested periods. If you cannot or will not use NMAIL, then you must keep retrying by hand; you will eventually get through.

   The Regional Mail Concentrators (RMC's) mentioned earlier in this document are another alternative.

6. **Q:** I had trouble accessing the file `GATEWAY.DOC`; here is what happened:

   ```
   $ type decwrl::gateway.doc
   %TYPE-W-OPENIN, error opening DECWRL::/GATEWAY.DOC as input
   -RMS-F-SYN, file specification syntax error
   ```

   Where did the "`/`" come from? What is the matter with the directory?

   A: This is one of those situations that makes you appreciate how well ULTRIX and VMS work together when they do work together. This time they don't.

   The short answer is that you have to quote the "`gateway.doc`", this way:

   ```
   $ type decwrl::"gateway.doc"
   ```

For those of you with a penchant for horror stories, here is why the "short way" doesn't work. The VMS "type" command first sends a "directory" command to the remote site. This is so you can do things like

```
type DECWRL::TEST.*
```

First, your computer sends DECWRL a "`DIRECTORY TEST.*`" command to get a list of the files matching `TEST.*`, and then it opens and reads each one in turn.

DECWRL is an ULTRIX machine. ULTRIX file names all begin with a "`/`" character. Just as the "true name" of some VMS file "`TEST.LIS`" might be "`DSK3:[REID.TEMP]TEST.LIS;4`", the "true name" of some ULTRIX file "`test.lst`" might be "`/usr/users/reid/temp/test.lst`". In the case of the file "`DECWRL::GATEWAY.DOC`", the "true name" of the file is "`/gateway.doc`".

The VMS system sends DECWRL a "`directory gateway.doc`" command, and gets back a list of the names of the files that match it. This list contains one name: `/gateway.doc`. The VMS machine then processes the command "`type DECWRL::/GATEWAY.DOC`", which it parses as a null file name with the `/GATEWAY.DOC` command qualifier. Failure.

But if you quote the file name:

```
type decwrl::"gateway.doc"
```

then it bypasses the file name expansion phase and just uses the name as you type it, whereupon it works fine.

7. **Q:** Where can I turn for more information?

A: Several sources, none comprehensive. There are various USENET newsgroups and EASYnet VAX notesfiles that can be used to ask questions or read answers. USENET Newsgroups `dec.mail.config`, `dec.notes.networking.gateways`, `dec.news.config`, `dec.mail.software`, and `dec.ip` are primary sources. The VAX notesfile `UPSAR::NEWS-BACKBONE` contains information about USENET inside Digital. The VAX notesfile `UPSAR::GATEWAYS` is the notesfile equivalent of the newsgroup `dec.notes.networking.gateways`; anything posted to one is automatically posted to the other.

The book "The Matrix", by John S. Quarterman (Digital Press) explains the worldwide computer networks. The book named "!%@::", by Donnalyn Frey and Rick Adams (O'Reilly and Associates) explains the mail addressing syntax of all the world's electronic mail networks.