DISASTER COMMUNICATIONS

PART 1 GLOBAL

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Mark Wood, G4HLZ

Disaster Relief Communications Foundation

Table of Contents

CHAPTER 1

1.1 INTRODUCTION

The fact is, without communications, you don't have an organisation, you have a disorganisation.

Everyone involved in disaster, aid and allied voluntary services is aware of the huge waste and nuisance caused by poor communications in the field. Time is wasted driving around looking for staff and equipment. The rapid deployment of the right equipment in the right place at the right time is impossible. Managers can have no idea what is happening once people leave their sight. Without eyes, ears and a voice, they are just by-passed by the staff at the front end of the job. The staff in the field know there is no back up, no help coming from outside, and would rather valiantly improvise than spend days in a possibly fruitless search for help.

The ease of communication in a developed city is seductive, so much do we take it for granted that it becomes like the wallpaper in the office (no cheating, do you remember the pattern?). It is a serious but common mistake to underestimate the complexity and importance of communications, that is why The Disaster Relief Communications Foundation **(DRCF)** continuously researches and reviews the whole matter, calling on expert opinion to keep their advice up to date.

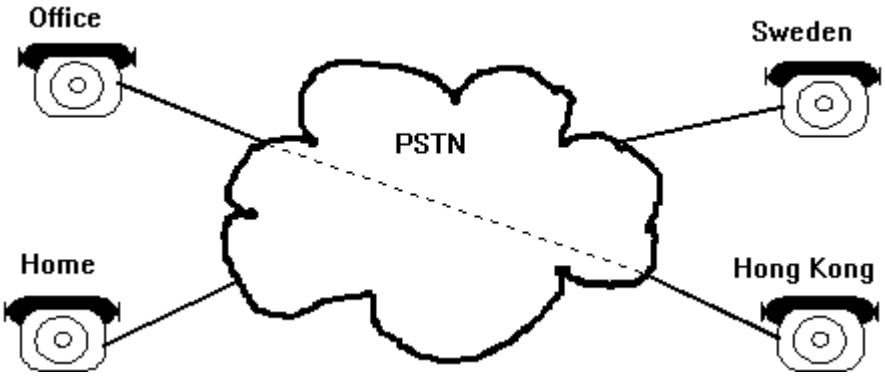

Fig 1 *The Public Switched Telephone Network (PSTN) is the largest single structure ever made by man.*

Communications may seem like only a third world problem but, even urban areas will find their normal (Landline) phones via the Public Switched Telephone Network (PSTN),[1] Mobile Phones[2] and Telex systems out of action in the case of most types of disaster because the cables may be damaged or there may be no mains to power the telephone exchanges.[3] A perfectly working PSTN system is usually designed so that no more than 5% of the phones connected to it, can be talking at the same time. During a crisis, there may to too much traffic for it to handle, and so it will become overloaded, so you will keep getting unhappy sounding tones when you try to dial. It is not even safe to take 'landline' services for granted in some locations of operation as they may be rather poor or even non-existent.

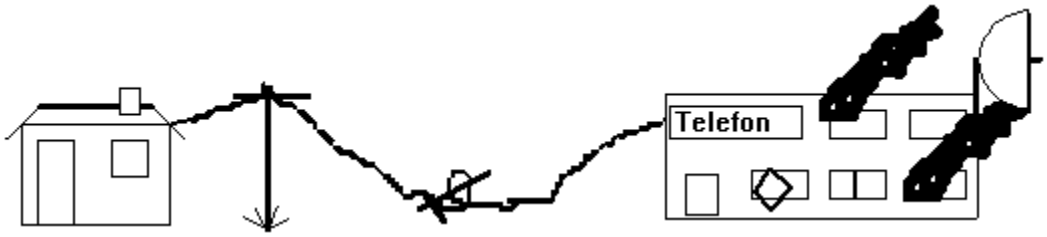

FIG 2 *The PSTN actually depends on telephone exchanges and lines on the ground which are vulnerable in times of crisis.*[4]

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Cyclone "Hollanda", Mauritius, February 1994. To prevent wind damage, the satellite dishes at the
earth station had to be parked in a horizontal position, they could not then point at the
satellite and thus all international communications to or from the island state was cut off.
Despite these precautions, it took three days to repair the damage, in the mean time, it would not
have been possible to summon help from outside. Technological and commercial pressures are causing
more centralisation of critical network elements, leading to their vulnerability in times of
crisis.
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So we must take our own communications that don't depend on any lines or power from the area. We also need something that can be set up in a few hours, anywhere in the world, with no previous notice or time to plan elaborate engineering. The solution must also be portable enough to be quickly moved into position by a small number of people, who will be too busy to spend hours with complex technology.

Most important, it must be **affordable** to the organizations sponsoring the relief effort .

The subject of **Local** or Tactical communication, short range communications between the team members or a local cluster of camps for example, is a separate one. This has been given consideration in part 2 'Disaster Communications- Local'

I will try to mention just about every practical system we at DRCF have ever heard of. Just because we mention (or don't mention) a system, **this is not an endorsement of the idea**. We merely acquaint you with the facts and leave you to decide what you think is best for you. Reading this won't make you an expert, but it will help you and your experts to come to a better understanding

The Disaster Relief Communications Foundation (**DRCF**) is a Non Governmental Organisation (NGO), a small registered charity, and we admit that our resources are limited. However we do try most conscientiously to make sure that what we say is generally agreed to be true, or at least valid opinion, by experts in the relevant fields. However if you know of something better that we do, we most sincerely welcome input, for future revisions of the book.

The powerful image of Captain Kirk nonchalantly pulling his communicator from his belt and effortlessly contacting anyone anywhere is not just a dream. By the turn of the century, systems like IRIDIUM, GLOBALSTAR, ICO, Teledesic, Ellipso, Odyssey,Constellation and many more, will bring just that and give hand held mobile phones that really work anywhere in the world. Then, there may be less need for books like this as there may be one obvious way to communicate with anyone anywhere, but as this service will not be available until 1998 at the earliest, and it's effectiveness is as yet unclear, we will consider those services available for our purposes at the time of writing.[5]

There are two methods.

- SATELLITE SYSTEMS, (we will talk mostly about the INMARSAT system)
- H.F. RADIO, (we will consider Private radio, Marine radio, Gateway and Amateur radio)

1.1.2 What Is 'Disaster Communications'?

The needs of disaster communications and aid communications are in some respects similar, but the operational needs of the two distinct types of organisation are quite different. This document is about disaster communications, but the information is applicable to aid users also, provided the differences are understood.

It is the target of disaster communications units to be on the scene of the callout not later than 24 hrs after the first alert. This sounds like plenty of time, until we remember that the personnel involved are Volunteers [6], who first need to be contacted by various means, usually by phoning around by their group leader. Then their employer may need to be contacted to get permission to be absent for the next two or three weeks and family business re-organised, grand parents found to look after the children, clothing and equipment packed etc, all with the phone ringing like mad as the team is assembled.

> ***Author's note:-*** *These definitions for disaster, aid and Emergency communications are my own invention, for use only in this document. Official definitions vary, but the UNDHA prefer the term "communications in the Acute Phase of an emergency" where I mean disaster communications. and "Long term Emergencies" where I use "aid". Normally there is no separate definition of "Emergency Services" made in legislation. By this I will mean state run and funded organisations. The word "communications" can mean forms such as Broadcasting and other media. For point-to-point communications, the term "**Telecommunications**" is preferred.*

Meanwhile, a deadline emerges, a transport plane must take off with the men [7] and supplies, and with only about four hours to spare, the equipment must be found from its storage place and brought to the mustering point. There is no time to test, no time to plan and certainly no time to train on complex technology.

This can be done only if the specialised teams have already got everything organised well in advance. The team members must be sufficiently familiar with the equipment, that once in the field, they can repair anything not working, or more usually, improvise things that somehow didn't make the deadline. They won't know how busy they will be, who and how many teams of what nationality they will serve, or for how long.[8] Networks will have to be created as they go.

A successful operation can only be achieved if the hardware taken to the field will certainly work without prior planning or engineering and if the staff are professional and self reliant.[9] Planning is impossible because the team would have no way of knowing where they are going in advance, or what existing systems may be still working on the site, or if anything is available at all, even electricity.

On the plus side, the operation can be expected to take about 1-4 weeks, so a temporary or makeshift installation is quite satisfactory and elaborate permanent systems designed to be in place for months or years are not needed. Also, some governments waive or shorten the licensing and Import duty requirements for the equipment, (if you remember to ask nicely).

Finance is a tricky question, from where and when the expenses will be met is often unknown.

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In one case, a small British NGO found their Inmarsat-A sat phone to be the only working
communications at the site of a disaster. This soon attracted attention from desperate officials
from other organisations to borrow it for 'one quick call'. On return to Britain, the bill was
beyond their resources to pay, and it was very difficult to prove who should pay what, the result
being very unfavourable for the NGO. The resulting severe financial strain nearly destroyed the
whole organisation. Fortunately they survived wiser but much sorrier. If people borrow your
communications facilities then make sure you know who they are, how much they owe you and how and
when they will pay. This goes for your own people too, Satcomms is highly intoxicating, you must
tell your client when he has had enough and close the bar!-IRC
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1.1.3 Differences to 'Aid' Communications

By contrast, aid organisations usually have weeks or months to plan their operations and have a good knowledge of where they are going and what to expect when they get there. They even have staff in place to carry out the operations needed, and also budgets in hand to finance expenses arising.

This means that proper planning and even surveying can be carried out before installation so that a well engineered installation can be done. Networks can be devised, and the recent history of the operation will guide as to with whom and how to communicate.

It makes no sense to have permanent Radio Officers [10] dedicated to communications in a refugee camp (unless traffic levels are high), so after installation, training of the staff who will use the equipment and become Radio Operators [11] or just casual users is most important.

The installations will be likely in place for some years, so a durably engineered solution is needed. Also the correct permits and licences from the host government will be needed by such an installation.

1.1.4 Emergency Services communications

In this book, I will not mention 'Emergency services' communication much at all. By Emergency services I mean such as the local Police, Ambulance Service, Fire Brigade, Civil Defence, Army etc. These organisations have their own existing communications system and networks. It is most likely that they will be working in their usual territory, so their normal VHF or HF radio system will be in range. These will however be supplemented by additional mobile control rooms, reporting centres etc, but again they will be using their own equipment kept in reserve for emergencies. Statutory emergency services will also have many full time technicians on call to set up and run their networks, so they are unlikely to have very big communications problems.

Experiences show that statutory services are highly self contained. Sometimes however, this has the down side that they may not be trained to see the need to help you by providing equipment or air time on their network. Also their networks will be configured to funnel information to their own control centre rather than the PSTN, so even if they do let you use their radios, you will only be able to send messages to their HQ. Maybe they will be happy to pass messages on for you but maybe not. This will depend on the attitude of the government of the state you are operating in and if a UN OSOCC is

operating.

You may find it difficult to communicate with their networks and may find them hostile to anyone trying to do so as they are trained to ignore any call sign that is not on their briefing list. The best policy is to depend on your own network and let your organiser speak to theirs on a peer-to-peer basis to organise a means of communication with them.

A further problem may be language. If you are working with teams speaking another language than yours, protocol may require that you work through an interpreter at high level in their organisation.

1.2 WHAT DO WE WANT?

Knowing the type and amount of messages you will want to send and to whom is the key to deciding which of the many systems to use, so let's briefly look at some of the factors in choosing the message types.

1.2.1 FOR PHONE

Most NGO workers I have asked (who were not communications experts) have expressed a preference for voice communications and by that they mean phone calls via the PSTN. The phone has much to commend it. Giving two way, 'live-as-it-happens' conversation [12], means that problems can be discussed and many alternative ideas brain-stormed in one conversation. It also has the advantage that the caller has the psychological reassurance that the person he[13] wanted has heard and understood the meaning of the message and besides, hearing the voice of a person you know is very warming.

Furthermore there are phones everywhere in the world and it is highly likely that the person you are calling has one at home should he be there. It is also the best way of reassuring relatives at home that you are well and happy in your work, and putting their anxieties to rest.

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Do regularly call your sponsors and family. Just 3 Min. every week or two is enough to hear your
voice and won't cost much.[14] Don't make a date or 'sked' you can't keep, as not hearing from you
when expected will make your family literally sick with worry. If overdue, get a message via
someone somehow so that they don't worry. If you are asked to pass on an 'I'm OK mum' message from
someone you meet, make sure that you do.
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1.2.2 AGAINST PHONE

On average, phone calls are a very inefficient way of communicating specific technical information, facts, tables of abstract figures and numbers etc. We must realize that a phone can ring just one other phone in the world. You the caller must know the number to dial, taking the risk that there is a person to answer that phone and that the person you need is near to the phone that you have just dialed. Sometimes the voice from the mobile station, whether by SSB radio or satellite may sound very strange to the new listener. Things may be awkward if the called person is not used to the simplex procedures or digitised voices with long echo and delay.

We are expecting the person at the other phone to drop what he is doing now and rush over to the phone, hopefully with pen and notebook in hand, and be able to answer your questions 'off the top of his head'. One problem is that the person you are calling is sure to be very busy, but you have no way of knowing if your call is more urgent than what he is doing right now. If he cannot answer questions now, we are relying on him to make notes detailed enough and accurate enough to contain all the information he needs to find the answer, then rush back to the phone with the reply.

Time is very important here as a satellite phone call may cost up to USD 8.00 per min. you can see that only 5 min. of wasted time costs USD 40! Even if the person is not there at the time and someone else takes notes for you to pass them on, we are relying on someone being in the office at the time, and making notes in handwriting clear enough for someone else to read, then finding the time to remember to pass the message on.

Another big problem is that of working across time zones. If you are wishing to call a person from their office number,

they may have a 24 Hr watch, or they may be available only during office hours in their country. It may be that you are much too busy at this time, on the move and out of communication, or only have a small window of time to be available for communication yourself. The solution is to call the person at home, but first you must have the number and the person's permission.

1.2.3 For Text

By a text message I mean a written message containing only letters of the alphabet and numbers. An example of a text message is a telegram or a Telex but also includes Electronic Mailing. The advantages of communicating by text are many. For example, the sender[15] does not have to worry about the availability of the person to whom the message is to be sent (the addressee), because the message can be passed on later.

Time zone and office hours problems are no longer a concern as the message can be sent at a time convenient to the sender. This is important as the sender will have his work set by the demands of the field, or probably be traveling much of the time and only be able to set up and use communications equipment when an opportunity presents itself.

By sending a text message, the sender can go through the ordeal of setting up his system when he feels he is ready to do so. The information can be compiled off line in a personal computer[16] in advance and 'beamed up' when ready. The sender is forced into the discipline of compiling his message in a logical order and presenting it in a meaningful way. The sender also has the opportunity to edit and review the message before it is sent. Just as important is the need to formulate accurately. This prevents the quite serous problem of inundating the addressee with lots of details and incoherent 'odds-and-ends'. As my grandfather, who was a craftsman, used to say, measure it twice, cut it once.

The sender can have the fullest confidence that the addressee or addressees have an accurate 'hard copy' (on paper) of the full text sent rather than a few scribblings of what someone else gleaned from a phone call and that as the message is copied and circulated, it will not be distorted as it is passed round.

If the people in the field have the luxury of a fixed location. then they can leave their communications equipment switched on and leave it unattended[17], freeing them to concentrate on their primary mission. They can be secure in the knowledge that if a message should come for them, it will be ready for them to look at and digest at their convenience, rather than having to assign someone to 'baby-sit 'the phone.

Text message systems are not generally 'real time' systems (though you can have this if you have a Telex, which also offers full duplex links). This has the advantage that having received a question, there is not the pressure for an immediate answer that the phone produces. The addressee has plenty of time (off line) to make a considered and full reply rather answering in haste and repenting at leisure.

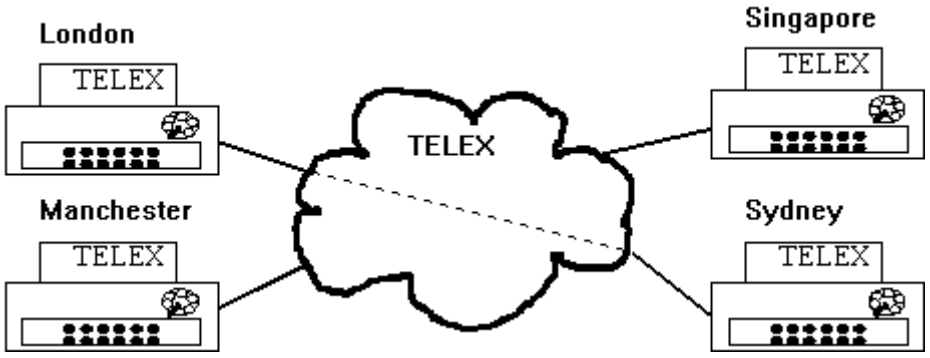

FIG 3 *The international TELEX*TELEX *system is the text version of the PSTN. Any TELEX can 'dial' any other telex and leave a message even if the receiving machine is unattended.*

It is MUCH cheaper in terms of call charges to send a text message. For example, by satellite the average short message cost USD 6-8 whereas the average short phone call will be USD 20-60. Text is the system supported by INMARSAT-C, which is the cheapest satellite system. A text message can be sent to any TELEX machine, Electronic Mailing system or computer with a MODEM, or text can be sent from a mobile unit in the field to a FAX machine on an ordinary PSTN

landline back at the office, (called SEMI-FAX)

Language problems are very seriously difficult to overcome by phone with misunderstanding being the usual outcome. A text message may be handed to someone more competent for translation, giving the addressee more confidence in his understanding of the meaning.

1.2.4 AGAINST TEXT

The lack of human contact means that it is less reassuring than the phone. For those who are computer literate and used to keyboards, screens and commands etc. it is a natural way to communicate but for others it can seem rather daunting to learn.

Text messages need some kind of hardware to receive them back at the office, a TELEX machine, FAX machine or a MODEM attached to a computer or Electronic mailing system. There are obviously fewer TELEX or E-MAIL terminals than FAXes or Telephones at the time of writing, so this has to be taken into consideration when deciding who the addressee is.

While most types of communications gear are very tough, the Lap Top[18] usually providing the terminals are not. Ask anyone who depends on Lap Tops and they will tell you what I mean. Computers also need regular charging, and a programme of backing up the hard disk to floppy disk. Remember that if your PC fails, nothing will work at all. The wisest thing is to carry at least two, both loaded with identical software and compatible hardware. You will have to test out both computers with the communications gear as small glitches are easier to fix at base than in the field.

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Three times during the writing of this document the whole document was nearly lost due to computer
problems; this despite using only licensed software. In one case a virus prevented the operating
system on the PC from booting up and the hard disk had to be reformatted. The document was saved
because of a regime of back up to floppy disc. BEWARE, computers can just CRASH (refuse to work)
and it is the job of an expert to fix them when this happens. In the field, where there is seldom
a Local Area Network (LAN), exchange of discs is frequent. Check each disc for virus before
running it. Sometimes exchange of files is impossible because of incompatible formats. As far as
you can, prepare files in the plain text ASCII format, or convert them to plain text (*.TXT)
before exchanging them. Other formats look prettier and more professional, but plain text is the
format least likely to cause problems. (Sending unreadable or corrupt files won't make you look
more 'professional').
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Any FAX machine back at the office can be used to receive a text message automatically (by Semi-Fax), but to send a text message from the office to a field team with a text terminal by fax, the message has to be faxed to BT MARINE's Portishead Radio station and then TELEXed from there. Alternatively faxed to a bureau or friendly Telex operator. There are plans to automate the sending of text only faxes in future. Text messages can not support graphical information such as maps, photos, diagrams etc.

A less obvious problem is that the field team will need to carry a printer. This is needed in order to print out the message on paper so that it can be passed to the addressee, if he is not able to come to the computer screen. Printers will need interface cables and Printer Driver programmes, some kind of power supply system, and plenty of the special paper and ink cartridges that the model needs, all adding to cost, bulk and weight. Take care to purchase only a model recommended for portable operation as many models, especially laser printers, will fail if moved roughly.

This fact also limits the usefulness of large data volumes, such as detailed maps and diagrams, in the field. A small portable printer can not do much with such documents. To printout anything worthwhile may need very large, heavy and expensive mains driven colour printers.

1.2.5 FOR FAX

FAX is not a separate system of its own like TELEX , but uses ordinary PSTN Phone lines. The FAX machine (Facsimile or Telecopier) scans the picture and sends it as data by a built in MODEM, taking usually less than 1 min per page

depending on how much detail there is on the paper.

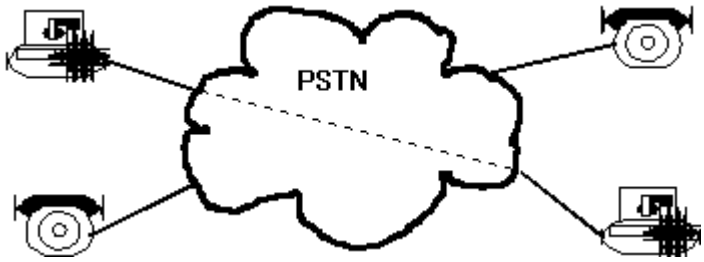

FIG 4 *FAXes use the ordinary PSTN network.*

It is the only system capable of sending graphical information such as pictures, maps, diagrams etc., and the only one sending handwriting in script. An important attraction is its ability to send messages in, for example, Chinese or Arabic text.

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The CICR (International Red Cross) prefers text messaging as a rule, but has found one advantage
of FAX. Sometimes a convoy needs to pass a checkpoint or border and the local official is
reluctant to allow this without the properly accredited certificate or form. By using fax a copy
of the form complete with the stamps, seals and signatures may be shown to the official and this
may sway him.
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There are now a large number of FAX machines in existence, most small companies have them as do many people working from home. Many FAX machines also automatically stamp the FAX with the originating FAX number and date/time. A journal also keeps account of how many messages are sent or received from the FAX.

From the point of view of convenience, as operators are not required to receive faxes, all the same advantages apply as for text. The field team can leave it switched on, unattended and check for messages periodically.

FAX can be supported by INMARSAT-A, INMARSAT-B, and now INMARSAT-M though a special port has to be provided in the terminal for this. HF radio does not offer a public two way FAX system via PSTN at the moment, though there are projects working on this.

As an added bonus, most FAX machines offer a facility called Local Copy, meaning that it can also be used as a photocopier and some models can also function as a computer printer and image scanner.

If you do not wish to carry a Fax machine, any PC can be programmed to generate and receive FAXes. However this usually means that you can't use it for something else while it is waiting for an incoming call. The problem is that you would still need a printer to hard copy the FAX , to show it to someone who cannot come to the computer.

1.2.6 AGAINST FAX

You will need to carry a FAX machine around with you, and plenty of the special paper that some models need, as ordinary paper won't do for some models, and the correct paper can be hard to find out in the field (it even varies from model to model). You must take care to buy a portable model as some plain paper FAXes are sensitive to bumps and will just turn out grey rubbish once moved. The machine must be sited somewhere well-lit, dry and not windy (or incoming paper sheets blow away before being read).

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The Camel Trophy communications team reports that in very hot and humid conditions the fax paper
tends to become sticky and won't pass through the machine. The solution is to pass two sheets
through at once.-Transat.
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Technical people tend to be less enthusiastic about FAX than, for example, electronic mail, because FAX is not very efficient in its use of bandwidth or data. For example it can be very slow over a Standard-M terminal. A big problem is, when you have received a FAX, there is nothing you can do with it but read it and store it as paper. You are not well advised to pass it on to someone else by FAX as FAXes become unreadable after only about 4 re-generations. It is better to ask the sender to send a copy of the original to the intended recipient. Even if you scan the FAX into a computer, it can't read the message, which it treats like graphics.[19] This means it can't be inputted into a word processor unless the whole thing is re-typed. Another problem is power, FAX machines need mains power, or regular charging if they have batteries.

1.2.7 SEMI-FAX

This is an automatic service provided by BT. It takes TEXT messages from its INMARSAT-C terminals, or from HF Radio Telex terminals,(which are in TELEX format), automatically converts them into a FAX image and sends the FAX to the number you specify. The problem is that it can send only text, no pictures and only works one way (from mobile to FAX machine).[20]

1.2.8 ISDN

This stands for Integrated Services Digital Network.(ISDN)[21] It is one part of this new Data super highway that everyone is talking about. President Clinton of the USA thought it so important that he assigned his vice president, Alan Gore to supervise its implementation. It will bring remote control libraries, video phones, and more besides in the future.

A big problem is that in field conditions you may not have the hardware to process the information. Also there may not be the time for anyone to generate or really digest the information.

ISDN is of use mainly to industrial / scientific and journalistic users at the moment and is supported only by INMARSAT-A, INMARSAT-B and INMARSAT-M . I have not included it for further consideration at this time. However if a need should arise for ISDN in a disaster or aid role, as it surely will in the future, the technology is there and I will be watching with great interest.

1.2.9 Internet Electronic Mail

'The Internet' is a network of computers connected together, mostly by ISDN circuits. I could write a fat book about this, but to simplify, it is a sort of super TELEX. There are however, some important differences to mention. You would use your personal computer to contact a 'Host', (an ordinary computer which is running a special mailing software and is connected to the Internet), either by Local Area Network (LAN) wiring in your building, or over a dial up PSTN phone line via a modem. You would then send you message to the host. The start of the message must be the Internet address of the addressee. This is not a number, as in TELEX but something like 'eus.eusmwoo@memo.ericsson.se', which is my address. (You are welcome to contact me this way if you wish). When you have finished your message, it is passed from host to host until it reaches the host which is the mailbox for the addressee.

It then remains there until the addressee next connects his computer to his host, when the message is then read on his computer screen, or printed out. The problem is that there is not always a bell or bleeper to alert the user to log on (connect up) and retrieve his mail, so he may be unaware if there is an urgent message pending. Although the message takes a few seconds to go to the mailbox, it could be hours or even days before the user logs in next, so it is best to alert the user in some other way if you have sent an urgent E-Mail message via Internet.

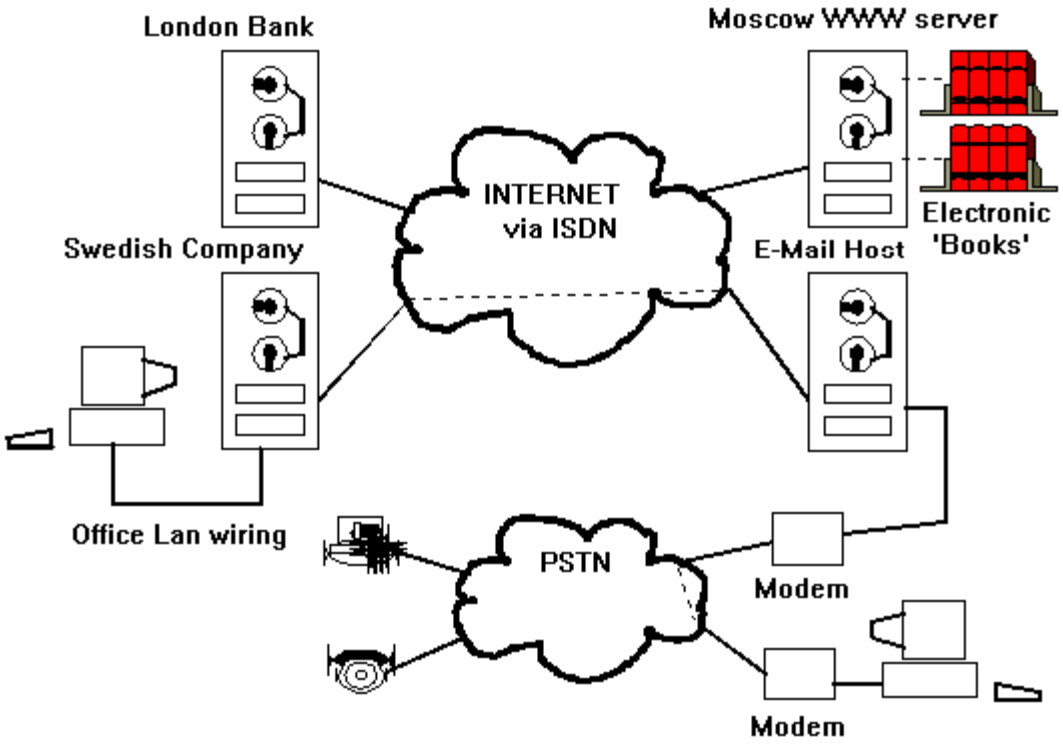


Fig 5 ISDN is like a 'phone system' for computers enabling them contact each other. This is how services like Internet and World Wide Web are supported.

1.2.10 World Wide Web (WWW)

Another use for Internet is to download computer data files from disc drives in machines far away from your own, by so called 'File Transfer Protocol' (FTP). There are many ways of doing this but I will not elaborate on them here because they are not strictly communications related functions. The World Wide Web (WWW) uses a special form of Internet signaling, called Hyper Text Transfer Protocol (HTTP), designed for remotely reading 'Electronic Books'. Special 'WWW Servers' have electronic books, including pictures and diagrams, available for browsing at the click of a mouse.

This book, and others by the DRCF will be readable on the web. disaster users could read maps and information about the area where they are working, for example. The WWW system is still quite new (in 1996) so the information is quite patchy at the moment. My prediction is that once money starts to be made on it, it will balloon to stupendous size and become one more of those thing we can't live without.

When you are browsing through WWW in your office, over your LAN that is one thing, but trying this over a satellite link or HF radio link is quite another. WWW files often contain detailed colour pictures or graphics such as logos at the top of each page. These use much, much more data than the whole of the rest of the document! Wether you pay by the kilobyte or by the minute, you pay very dearly for every byte you download to the field. You must resist the temptation to browse aimlessly with WWW in the field. The solution is to let someone at HQ browse for the information for you, then edit and send a digested version to the field. Or you can programme your client application (Mosaic or Netscape) not to download images unless you say so. Don't be tempted to download something that 'looks interesting' unless you are sure that someone will have the time to digest the information.

The best book on this is 'Internet for Dummies', see Bibliography.

1.3 Networks

An important subject that you ignore at your peril is Networks. Both HF radios and Satellite terminals can 'plug in' to the international phone system, but the problems don't end there.

The chances are that the people you need to speak to are on the move themselves, like you are. Do you know what phone

number they can be reached on? Are they using radio, or satellite terminal, phone or Telex? Who is their assistant and who is their manager?

Who has the equipment you need, where is it, when can you expect to have it ? Who needs the equipment that you seem to have and can't find a use for? Why are you twiddling your thumbs when you know you are desperately needed elsewhere? Do your sponsors know where you are or are they desperately trying to contact you?

To compound the problem greatly, virtually none of the established systems allow communications while on the move in a car. Most types of gear have to be unpacked and set up before use.[22] Because of power budgeting, things can't be left on indefinitely when not in use and security aspects go against leaving things un attended. Anyway, there is no point in setting up your very expensive satellite phone if you can't be in ear shot of the bell![23]

In fact, communications gear may be only switched on for a few hours a day, once or twice a day or when convenient. Do you know when the station you want to talk to is 'on watch'?

To save money, HF radio can be used directly from point to point in the Simplex mode. Do you know what frequencies and at what time your colleagues monitor? There are usually daily 'round table' 'chat shows' where local teams can chat about the problems of the day and help each other. Do you know when and at what frequency they occur?

If you tried to address all these problems when out in the field, you could waste hours of each day and a lot of money on the necessary calls. Obviously someone back at base, usually called a traffic dispatcher needs to track all of this information and funnel it back to you. That person should be the sort of person who is not shy of making a nuisance of himself, being a real nosey parker, minding everyone else's business and hoarding every scrap of information and gossip he hears.

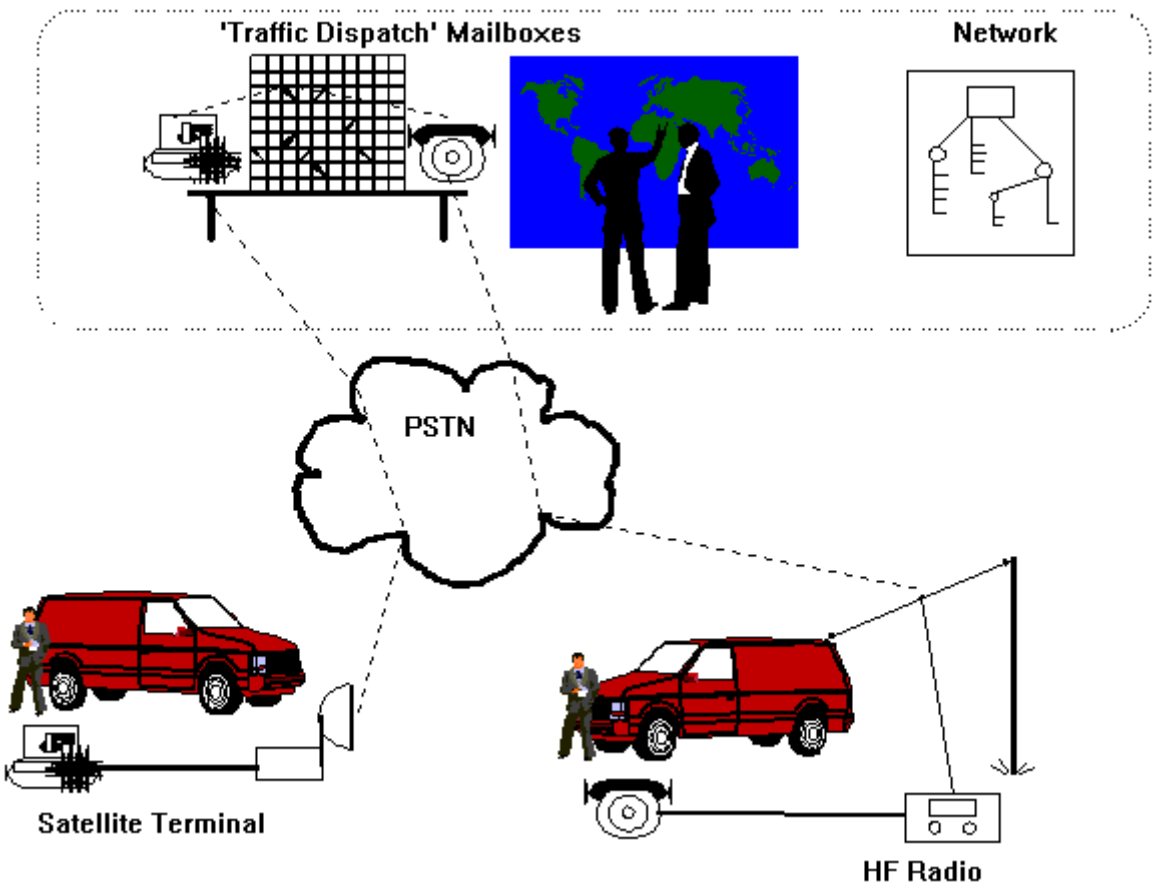


FIG 6 *Having a Traffic Dispatch function maximises the value of any system.*

This is the method favoured by the BBC and most News organisations. Journalists call in to a phone number called 'Traffic'. First they are passed any messages for them from elsewhere in the BBC, which have been sent to the traffic dispatcher. They then dictate their report over the line which is either tape recorded for transmission or typed out. This is what has happened when you see a Photo of the journalist and hear a scratchy voice on the TV news.

Everyone must report their position and status, and agree to (and keep) scheduled reporting times (called 'Skeds'), this includes you. You should also report who is with you and from what organisation they work so that messages to them can be expedited. Another advantage of such an approach is that if you go out without an exhaustive phone directory, you have only one number to remember to retrieve the rest. Your coast radio station can help you to find who you need if you are really stuck, provided they have been warned in advance.

1.3.1 Trafficking messages

One reason for the reluctance of some people to send particularly important messages by text is lack of confidence in the system. When you make a phone call, you can hear a voice you know saying "Yes, I see" or "got all that, I'll have it done by your next sked". If you send a text message, he will have a much better idea of what you really want and won't forget the important details, that is, **if** he gets the message. You may need to know **when** he got the message for logistical reasons.

Do you remember the old fashioned Telegram with a sigh of nostalgia? Well there is no reason to dismiss it as a relic from the past. Over a hundred years of experience has made trafficking telegrams a thoroughly mature art, and there are many features of them that we do well to learn from. You may scoff now at the unreadable gobbledygook in the first line of a telegram, but this was the 'Preamble' and its function is very important.

The first thing it tells is a unique message number and where it came from. From then on and forever this message will be identifiable amongst all the others. this will make it possible to refer to this message later and in this way track its progress. The number may be something like 'Aidcamp4' meaning the fourth message aidcamp base sent that day.

Obviously we also need to add at least the date and time when the message was sent, to avoid confusion, this should be in GMT (UTC). The preamble must say unambiguously who or what department the message is going to (The addressee). Other information such as how urgent the message is, is optional but these are the minimum. Other options are to say how many words there were in the message so that we can have confidence that we got all of it. It is a very good idea to end the message with a + sign meaning 'end of message', or the word "more.." , if there is more to come.

```
=AIDCAMP4 941005 1058
=TO BLOGGS AIDBASELONDON
=RECEIVED YOUR AIDBASELONDON 3,4 AND 7.
=DR SMITH AND NURSE JONES ARRIVED 0900 TODAY. WHERE IS THEIR EQUIPMENT?
=BILLBROWN+
```

Fig7 a well formatted text message. need not be so formal as this but should contain information uniquely identifying it. Notice confirmation of arrival of his messages number 3, 4 and 7. He can now 'check them off' in his log.

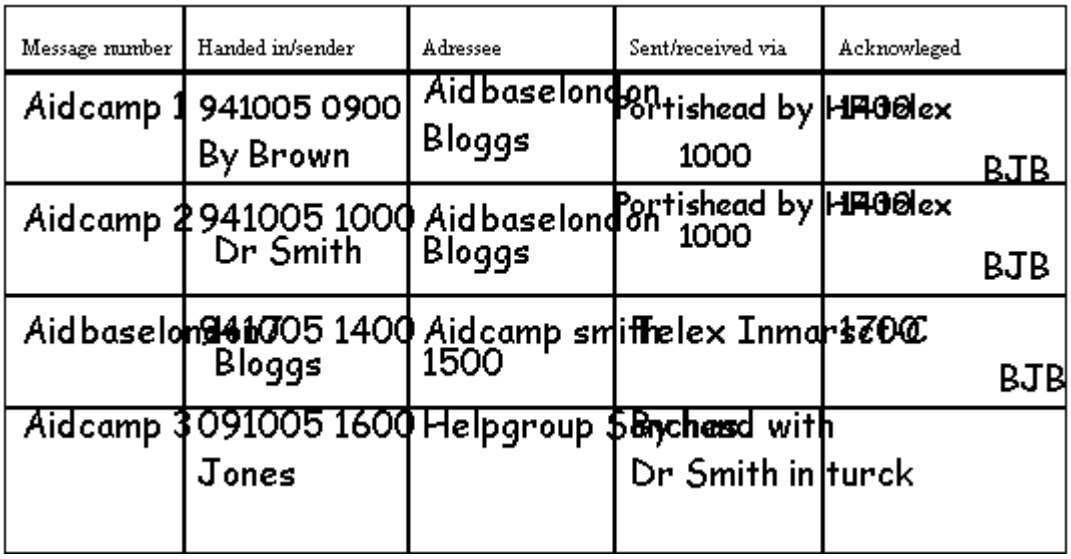
```
=AIDCAMP5 941005 1400
=TO BLOGGS AIDBASELONDON
=SORRY JOE I LOST YOUR AIDBASELONDON 9 PLEASE RESEND IT.
=BILLBROWN+
```

Fig 8 A 'service message' is about messages. it is only possible to track lost messages properly if they can be identified.

1.3.2 Keeping a Log

Whenever a message is sent or received, a note about this should be kept in a special book, called a Log book.[24] There

should be columns in the book for details about the message such as who sent it, when, and when it was passed on from our station to the next one in the chain.[25] Another important feature should be a confirmation of when the message was received by the addressee. This will help us to know how long it really takes to send a message to someone, for future reference. Even the destination and duration of phone calls must be so entered so that charging can be tracked. Someone must check the log books at least each day to make sure that messages did get passed on and were not forgotten. This also applies to messages written on paper by hand and sent in person by truck. Check that they were acknowledged by the place to which they were sent for onward transmission, and that they were acknowledged by the addressee in due time. With some systems, this is automatic.[26]



Message number	Handed in/sender	Adressee	Sent/received via	Acknowleged
Aidcamp 1	941005 0900 By Brown	Aidbaselondon Bloggs	Portishead by 1000	Telex BJB
Aidcamp 2	941005 1000 Dr Smith	Aidbaselondon Bloggs	Portishead by 1000	Telex BJB
Aidbaselondon	941005 1400 Bloggs	Aidcamp smith 1500	Telex Inmarsat C	BJB
Aidcamp 3	091005 1600 Jones	Helpgroup 5	Brought with Dr Smith in turck	

FIG 9 A log book helps keep track of messages and makes sure none get lost.

1.3.3 Echo Tests

Periodically it may be useful to use Echo Tests. These are messages to the other stations below you on the network hierarchy. They should ask the person receiving the message to send a message saying at what time he **read** the message. This will give you a realistic idea how long it takes to send a message to someone. If you think it is taking too long, you can revise your procedures to speed things up. If you get no reply at all, you can suspect a technical fault and get it fixed before an emergency call is lost. On the other hand they do cost money and are only needed if there is not enough regular flow of traffic to a particular destination to promote confidence in the link.

1.3.4 Summary

Every solution brings its own problems, so someone in your organisation should set their mind to the networking problems that communications solutions will present. You don't have to have an elaborate control room set up, rather someone trained and resourced for this responsible task. If you don't, you will be wasting a lot of your money on expensive technology that is not being used efficiently.

At least two British organisations[27] are now looking into the problem, with the aim of establishing a central 'clearing house' (not central control) for such information which would be manned round the clock with communications experts.

The United Nations Department of Humanitarian Affairs also has such a scheme called the On site Operations Co-ordination centre (OSOCC), a field communications centre with expert operators in the field at the site of the disaster. They are equipped with Satellite, HF and VHF equipment and link to a control room in Geneva. Information about how to work with them is available from the UNDHA telecommunications centre at the Palais des Nations in Geneva.

Only when we have thought out these basic factors about our communications needs, can we now approach the systems technologies that will act as carrier to our communications. However it may also be that we need to modify our organisation's culture to accommodate what is possible within the budget that we have set ourselves. Anything is possible

with technology but at a price. Only when we have considered both things can we engage in intelligent discussion about this, so lets start looking at what is on offer.

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[1]Americans call it the 'Plain Old Telephone System' (POTS), 'Ma Bell' or 'the twisted pair'.

[2]In this document the PSTN will also mean the Public Land Mobile Network (PLMN), also known as Cellular Mobile Telephones. The PLMN depends on transmission from the bearer network and terrestrial Base Stations within 50Km of the disaster zone. Therefore it may be nearly as vulnerable to disaster as the PSTN is.

[3]In fact the different services are usually switched by separate systems but sent down the same line transmission network (for reasons of economy). This is known as the Bearer Network. It uses the local telephone exchanges in the area. If it fails you will lose everything depending on it.

[4]This is also true of Telex and ISDN services which depend on the bearer network.

[5]It is intended to update the document annually, please contact DRCF for an update.

[6]Disaster volunteers are usually professional or qualified people who agree to make themselves available on a callout basis. They are either sponsored by their company or take annual leave during the call. This is the reason for the short availability window of such teams.

[7]In this book men shall also mean women.

[8]Because volunteers are seconded from their full time professions at short notice, a term of duty for one person will normally be 10-15 working days. After this, new persons will probably be needed to continue the operation if required.

[9]Qualified Radio Officers are well suited to Disaster Communications duties.

[10]A Radio Officer is a highly trained (to 3 year HND level) professional person who is not only technically trained but also trained in normal and Emergency message handling. They must hold an international permit to operate such as a Marine Radio General Certificate. They typically have a background from ships, expeditions or the military.

[11]A Radio Operator is trained only in operation of the equipment and normal message handling. Training typically last a few days.

[12]When both ends at once can talk, it is called 'Full Duplex'. If they have to take it in turns and say 'over', It is called 'Simplex'.

[13]In this document, He or Him shall mean She or Her.

[14]You can tell your coast radio station to interrupt you when a certain time or a certain charge is up.

[15]In text messages, the sender is the person whom message is from, the addressee is the person to whom the message is sent. This distinction is made because a message arriving at one telex may be sent on to another to reach the person or persons who are the addressee(s).

[16]In this document the term Personal Computer will mean in the generic sense.

[17]Provided there is reliable power and security.

[18]In this document 'Lap top' is used in its generic sense.

[19]There are 'text bridge' programs which recognise text and will re-generate the text as an ASCII file, but they are laborious and unreliable.

[20]Very often used by the UN and others.

[21]In this document ISDN will include Public Packet Switched Data Network X25.(PPSDN) and Public Circuit Switched Data Network (PCSDN) and TCP/IP INTERNET networks. Although separate logical networks, they all share the same vulnerability to the bearer network.

[22]Only INMARSAT-C and HF radio (in good conditions) can be used in a moving vehicle.

[23]Cordless phones can be directly connected to some models of INMARSAT terminal

[24]This is a legal requirement in most countries.

[25]There may be good reasons for passing messages to another place with better contacts for greater economy or reliability. If so you must check that they did remember to pass the message on.

[26]Many systems carry out this operation automatically, but confirmation is sometimes only provided when you remember to request it. As it costs about 16P per message it is well worth it. It is still worth keeping a paper log book separately in any case.

[27]The Path-finders, of the 'World Memorial Fund for Disaster Relief' and The Cranfield Trust.