DDA SUBJECT FILE COPY

ROUTING AND RECORD SHEET

SUBJECT: (Optional)

FROM:

William F. Donnelly
Deputy Director for Administration

EXTENSION

NO.

DATE
25 August 1987

TO: (Officer designation, room number, and building)	DATE RECEIVED	DATE FORWARDED	OFFICER'S INITIALS	COMMENTS (Number each comment to show from whom to whom. Draw a line across column after each comment.)
1. D/OC				Don:
STAT 2. [redacted]				Enclosed are a series of notes that have been flying around here at Headquarters on the topic of "cables." I think you should be aware of the dialogue.
3.				
4.				I suggest you get in touch with Ed Maloney and make arrangements to send [redacted] abroad to visit two or three of our communications installations, including a large one. If he is going to stimulate discussions such as revealed in these messages--and I'm not against that--he ought to have a bit more exposure to OC abroad.
STAT 5.				
6.				
7.				
STAT 8.				[redacted]
9.				William F. Donnelly
10.				
11.				
STAT 12.				[redacted]
13.				
14.				
15.				

FORM 1-70 610 USE PREVIOUS EDITIONS

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25 June 1987

STAT

NOTE FOR:

FROM:

SUBJECT: Think Piece - "Cables"

As Bill points out, there are many institutional barriers to rapidly moving away from "cables". However, there is the opportunity to start modifying the customer's perceptions such that he will accept the notion that "cables" are a special, stylized form of E-mail. Most of the current end-user developments,e.g., CRAFT are viewed as "cable" systems even though they are obviously customized E-mail machines.

Once the customer identifies cables with E-mail, he will quickly see the possibilities of simplifying his world and many arcane ideas will begin to evaporate.

This will make the Agency system better but will not rid service organizations of the "cable" problem in our generation. The need for common interchange formats among and within the U.S. and allied Governments will, as a minimum, guarantee a continuation of the classic gateway conversion requirement.

At this point in time, the issue is the engineer's bane-public relations and customer perceptions.

SUBJECT: Think Piece - "Cables" (U)

STAT

Finally, if we can agree that a major portion of our communications network must be Agency owned and operated for reasons of security and assured availability under almost any circumstances, why not maintain and improve upon a design that has proven effective in meeting unique Agency needs over the years, requires minimal effort by our customers to use and can withstand the kinds of stress not experienced by architectures serving private industry? I wonder how commercial architecture

STAT would have coped with and multitude of other similar situations that have occurred over the past 25 years? (U/AIUO)

26 June 1987

NOTE FOR: William Moyer

25X1 FROM: [redacted]

25X1 SUBJECT: Think Piece - "Cables" [redacted]

At the risk of being labeled "old fashioned" (or worse) I would like to point out some issues that were not fully addressed
25X1 in Bill's paper. [redacted]

First, I don't believe there is a commercial communications architecture available that would provide the services, reliability and security required by this Agency. And let's not kid ourselves into believing that Agency communications needs are not unique; the requirement for cryptographically secure communications alone makes us unique in comparison to the private
25X1 sector. [redacted]

The Agency staff communications network provides a variety of
25X1 service [redacted]
25X1 [redacted] around
25X1 the globe. [redacted]
In my mind, your concept calls for a highly robust network of relatively high data rate circuits to every one of these facilities. I can think of only two ways of implementing such a network: 1) rely on commercial lease service, and 2) enhance the existing network (one that incorporates a mix of USG and commercially provided service, predominately the former). I don't believe the first option could be implemented even with an unlimited budget -- some countries cannot provide internal telephone services much less high data rate international telecommunication services. The second option could possibly be implemented but again, not without very major enhancements to USG owned systems beyond those improvements already planned. Agency
25X1 [redacted]
25X1 [redacted] In any event, very major, very high cost improvements to our entire telecommunications
25X1 infrastructure would be necessary. [redacted]

25X1

-- Warning Notice --
Intelligence Sources
or Methods Involved

[redacted]

SUBJECT: Think Piece - "Cables"

Two important issues to be addressed in this context would be our requirements for message protection and message integrity. We protect messages from disclosure by encrypting them; these protocols would have to work with our encrypting methods and hardware. We also employ elaborate methods to account for the passage of a message from its origin to its destination, so that our systems provide great confidence that messages do not get lost. Integrity control of at least equal capability would be required.

What should we do about these ideas? It's time to take a high-level look at allof our communication systems, with an eye toward adopting new approaches to their implementation that would allow us to deliver the present capability, with all the controls that it now offers, in an environment featuring new architectures, making extensive use of commercial technology. Such a system environment can preserve the good part of what we have while providing us a platform for implementing new kinds of applications.

This sort of high-level examination of the issues could be done by us or by us with contractor participation. The ideal team might consist of several Agency people, from OIT and from OC, and several highly-qualified contractors (who might come from one or several companies); the team's job would be to develop a system concept that would meet Agency needs and make maximum feasible use of commercial products, providing advanced communications protocols. I'd see this as about a 6-month job for a handful of people.

SUBJECT: Think Piece - "Cables"

shorter implementation costs, and improved ease of adopting new technology.

The second suggestion that Bill is making is that, while we are rethinking our approach to communications, we ought to look at some wholly new concepts that have emerged into the commercial mainstream. Some of these are networking concepts, with the use of shared lines, automatic alternate routing and network management. I believe that we're beginning to pay attention to these issues.

The major architectural concept that Bill brings up is that there are new communications architectures that go beyond cables. There are advanced protocols for connecting together two programs, one possibly running in a workstation that serves a user, that allow those two programs to cooperate in providing higher-quality application services than otherwise can be delivered. While we're rethinking our communication systems around new concepts, we ought to incorporate these advanced protocols.

One of the important protocols is a store-and-forward protocol that allows the exchange of information between programs for what can be called an "office mode" of computing. In the past, there have been only two modes of computing, "do-it-now" (interactive service) and "do-it-whenever" (batch service). A computing activity was either to be accomplished at once, or it was a batch submission, to be dealt with at some time in the distant future. This new concept allows for information to be routed through several different applications, that can all be active at once, each receiving incoming work from a queue much like the inbox on a desk and putting outgoing work in an output queue. With such applications, information processing systems can be implemented that work like the paper flow in an office. Such information processing systems can automatically make extractions, copies, routing actions and otherwise act on information. Ultimately, as we tie together computers in the field and in Headquarters in structured ways, applications using these advanced protocols could eliminate a lot of rekeying and manual resending of routine information that now takes place.

You've no doubt noticed that a store-and-forward protocol can also be used to implement a message delivery system; this, the cable deivery system we now use can be implemented within this framework. That is, within this new world of advanced protocols, we can implement the cable service that we now have, preserving all of the useful capability we have now, but providing a path for future expansion of capability as well as a lower-cost, more commercial platform for our systems.

17 July 1987

STAT

NOTE FOR: [redacted]

FROM: [redacted]

SUBJECT: Think Piece - "Cables"

This is my attempt to identify the consequences of following through on Bill's suggestions, developed after reading Bill's
STAT note and talking to Bill and [redacted]

I think that Bill's intent is to state that in a technical sense the communications services that we now provide are being provided in a primitive fashion, although our dedicated people nevertheless manage to do a very effective job of delivering services, primarily by means of very hard work on their part. If we can improve our technical plant, we can leverage the efforts of our people so that this same high quality of service can be provided with greater, in spite of the staffing limitations we face.

To me, Bill is suggesting that future direction should not be toward achieving higher and higher capacity with the present approach. Rather, he is suggesting a fundamental examination of the approach we are using, because new directions appear to offer important benefits.

There are several components of the directions that Bill is suggesting. One of them is increasing use of off-the-shelf technology that can be achieved by basing designs on industry practice rather than custom-tailoring to meet a specific requirement. An objection to this approach is to state that "there isn't anything in the commercial world that does the job we want". The answer to that objection is "change your system design so that it can be built with commercial components". This approach requires a different attitude at the very beginning of a project--the search for applicable technology, and the clever use of that technology to solve our problems. If there are indeed Agency-unique aspects to a requirement, our challenge is to find a way to accomodate those needs within a framework of off-the-shelf technology.

The benefits of making maximum use of commercial technology are well demonstrated--dramatically lower system implementation and maintenance costs, continued performance improvement with development cost because of product improvements made by vendors, improved reliability because of wider testing, dramatically

25X1 SUBJECT: Think Piece - "Cables" [redacted]

It is true that multi-national firms have established highly sophisticated communications networks. Then again, most of these
25X1 companies don't have branch offices [redacted] We are constrained from taking full advantage of commercial solutions by the very nature of our business.

-- We can't rely exclusively upon commercial communications
25X1 networks. [redacted]
25X1 [redacted]
25X1 [redacted] This limits our network to slow-speed (2400 baud and less) transmission circuits. There is an initiative under consideration to augment Government-owned satellites with commercial satellite communications.

-- We require an exceptional level of security in our communications systems. Unlike our data processing systems, the computers used for communications are allowed to talk simultaneously to systems operating at different security levels. Because most of our circuits are encrypted, we also need to have handshaking with the encryption gear. Needless to say, these are not features found in most commercial products.

In the case of some stations, there just isn't bandwidth available to take on applications other than narrative messages.
25X1 [redacted]

I agree that we should buy, not build, components for our communications networks, where possible, even if we have to make a considerable investment to bring the systems up to our standards. Unless I'm mistaken, this is the principal direction
25X1 in both OC and OIT. [redacted]

I do not believe that it would be worthwhile to press for the wholesale replacement of our narrative message applications with commercial products. We should be building better bridges between our narrative message applications and our office automation systems. We should be pursuing applications which can take advantage of the new capabilities offered by MERCURY. We should also be investing in the backbone network so that we can support those new applications. But the cable is far from
25X1 obsolete and will be around for quite years to come. [redacted]

25X1 SUBJECT: Think Piece - "Cables" [redacted]

with good reason, we are making progress in applying automation
25X1 to enhance our communications with the field. [redacted]

Changes in technology at Headquarters and in the field have blurred the distinction between the traditional narrative message and a document stored within an office automation system. A cable has become a specialized form of electronic document, deriving its cachet from processes which occur in our message
25X1 processing applications. [redacted]

It is far simpler to replace technology than to change the way we do business. We are utterly dependent upon the narrative message, just as the commercial world relies heavily upon the Telex. This dependency is based upon solid requirements:

-- We are required by law to keep records of our communications with the field. Commercial office automation systems are more oriented towards informal communications and the design seldom takes records management into consideration.

-- We require that our communications with the field include a auditable mechanisms for authorizing the release of a message. This is simply a prudent business practice. The lack of such features in commercial systems compelled us to develop a "home-grown" electronic mail system for use within the less demanding Headquarters environment.

-- We must disseminate messages arriving at Headquarters based upon content. Commercial solutions assume that the sender is capable of specifying the recipients. Even if we were to make greater use of off-the-shelf products, we would retain the requirement for contextual dissemination. This is also one of the areas of greatest investment.

To satisfy these requirements, we would still have to "roll our own" applications or substantially enhance the vendor's applications. In fact, this is precisely what is happening with
25X1 MERCURY. [redacted]

While we are exploring commercial solutions for specialized problems not involving record communications, the narrative message still appears to be the best vehicle for communicating with the field. Our efforts in building bridges between the narrative message and office automation systems has been quite modest, and we would probably benefit from a higher level of
25X1 investment. [redacted]

28 July 1987

25X1

NOTE FOR: [redacted]

FROM: [redacted]

SUBJECT: Think Piece - "Cables" (U)

Your paper was quite stimulating. It also provided the impetus for me to learn more about our foreign networks. Your points seem to make sense, but gloss over several major issues. (U)

There are two themes in your paper:

-- Let's employ commercial, off-the-shelf technology wherever possible in our communications networks; and

-- Taking the first point a step further, in our communications between Headquarters and the field, we should abandon our emphasis upon the traditional narrative message in favor of direct communications among office automation and host-based systems.

The Agency is aggressively pursuing the use of commercial solutions for our field communications. The MERCURY Program provides a good example. Of the six major pieces, two are essentially off-the-shelf products. Two more are commercial products that were enhanced to solve problems peculiar to secure networks. The remaining two pieces are custom-built, computer applications. Similar approaches are being followed in the enhancements to the underlying transmission systems. (U)

MERCURY also brings a significant architectural change to our field communications -- the network is separated from the application, thus allowing the introduction of new applications. In this sense, we are in the midst of providing the foundation necessary to do some of the things that you have suggested. (U)

As for office automation, efforts are underway to provide a direct link between our Wang systems in the field and the message switching applications. The CRAFT-TERP interface is being tested

25X1 [redacted] While it is true that we are moving slowly, perhaps

25X1 [redacted]

29 July 1987

25X1 NOTE FOR:

FROM:

25X1 SUBJECT: Think Piece - "Cables"

The discussion thus far has covered most facets of the problem and done very well at that. I would like to add a slightly different wrinkle. I believe that there will probably always be a requirement to process cables pretty much the way we do them today, with the command and control and rigorous audit capability. However, it is important to recognize that the Agency cable system handles much more than command and control. In fact, I would venture a guess that administrative cables are a significant portion of the cable load. Examples which come to mind are credit union transactions, pouch manifests, Electronic Time and Attendance, travel notifications, PAR's etc. As the capacity and capability of the message processing systems improved, these items which had been handled via pouch were added
25X1 to the cable system for electrical transmission.

Most of these administrative exchanges are data base updates or file transfers and are more suited to either an interactive or E-mail environment. If customers were offered the capability to perform these services interactively or via E-mail and they perceived an improvement in service, they would use it.
25X1

Furthermore, if service was significantly better and all of the security/reliability measures were provided, customers would
25X1 demand the same level of service for cables.

25X1

29 July 1987

25X1

NOTE FOR:

FROM:

25X1 SUBJECT: Think Piece - "Cables"

I have just a couple of quick, short comments for people to ponder and I won't get involved in detailed discussion. Some of the reasons for 'cable' traffic involve legal and accountability issues. In concert the DDO has an issue with 'command and control' to the overseas stations/bases. From a cryptographic security standpoint point-to-point or end-to-end keying is a policy long held by this Agency the correctness of which has just been reaffirmed by the Walker-Whitworth espionage case. There are also certain traffic the DCI has guaranteed the privacy of to
25X1 the highest level of the U.S. Govt.

25X1

29 July 1987

25X1

NOTE FOR:

FROM:

25X1 SUBJECT: Think Piece - "Cables"

Excellent, David! You have really been thinking about this "think piece", which was its purpose. We may arrive at different
25X1 conclusions, but that is fine too.

You say I have two themes. You are correct that the main thesis was "buy, don't build", however, I did NOT propose we do away with narrative traffic. In fact, I scrupulously tried to avoid suggesting an alternate architecture hoping the reader would focus on our current system instead of beating up on some
25X1 half baked proposal of mine.

To assist your mental processes I did suggest that we have remained with a roll-your-own telagraphy architecture, while private industry has moved to a commercial based interactive architecture in some cases and other companies have gone to an networked host-to-host E-mail architecture. I did my best, however, not to advocate either in the paper. One reader believed I was advocating an interactive architecture and explained at length why we could not do that. You in turn believe I am advocating an E-mail architecture which requires us to abandon our traditional narrative traffic along with 'command
25X1 & control', record copies, etc. The paper advocated neither.

Actually I believe we should accommodate both modern architectures where it makes sense. Where we have the bandwidth and the requirements we should provide interactive service. We are doing that today with DESIST. In more cases an E-mail architecture makes more sense today. I do believe that commercial networking & vendor E-mail software can serve as a foundation and that our special requirements can be accommodated on top of that without rebuilding the entire thing from scratch. I do not believe that adoption of a commercial approach to life precludes 'command & control', record copies, etc. as you seem to suggest. I believe you have also concluded that is what Mercury
25X1 has done. Fair enough.