An Alternative to ACP-126/127 Message Formatting

Abstract

The ACP-126 has been declared no longer in force. The ACP-127 documentation has also been frozen. A useful and concise message addressing and routing format would be useful during the current and continuing Grand Solar Minimum which reduces the effectiveness of HF radio communications. Minimizing the byte count of the headers and addressing of a formal traffic message will allow more data to be transferred between stations in less time, and thus with greater reliability.

Additionally, simplifying the header and addressing information makes it more accessible to those who must read, understand and act on that data to effect message relay or delivery activities. Current ACP message formatting is largely built around the notion of the Teletype machine, which is largely no longer in use. A 5-bit alphabet for messages, certain "functions" in the process of creating messages and other seemingly unusual requirements of the current ACP's are largely legacy features which have no place in modern technological implementations of record traffic origination and delivery.

While this proposal takes aim at the military/governmental message formats of the ACP's, it is by no means limited to those formats. The concepts presented could find application in commercial and amateur radio arenas just as easily.

Definitions

ACP-126/127 = Allied Communications Protocols used to describe and set rules on message formatting and communications circuit operations.

"5-bit alphabet" = The ITA2 (or USTTY) 5-bit teletype alphabet

"RIPv2" = Routing Information Protocol version 2 (used in IP sub-networking to route packets)

"ISA" = Individual Station Address(ing). A "unique" combination of station name (call sign) and routing end point (RI)

"HF radio" = High Frequency (short wave) radio systems

"ALE" = Automatic Link Establishment

"2G" = Second Generation

"3G" = Third Generation

"CMF" = Condensed Message Format" (this proposal)

"ACP-201" = Allied Communications Protocol number 201 dealing with "electronic communications"

"UTC" = Coordinated Universal Time (Zulu Time)

Proposal

This paper proposes a message formatting alternative, informally named "Condensed Message Formatting" (CMF) which would use key elements from both ACP-126 and ACP-127 in order to create addressing and routing headers which are both human readable and machine processable. This would enable and encourage automated message routing between stations. While both aforementioned ACP formats discourage the mixture of call signs with routing indicators, it is the contention of this paper that when combined together, they create a very concise way to route messages from end point to end point, or from an end point to an "address group".

These "rules" lend themselves well to a form of routing not unlike an Internet routing protocol RIPv2, where each "router", or in the case of HF radio systems, "relay" need only know the "next hop relay" for that message.

Where 2G ALE or 3G ALE systems may be in place, the "relay" becomes an ALE station. The CMF header and addressing data can be directly mapped to a "relay table" (like a routing table in Internet parlance) of ALE addresses. Thus, when a message arrives at a relay station, it's CMF header is evaluated by the included Routing Indicators which make up the "domain" feature of the addressing. The Routing Indicator is then mapped to a "next hop" ALE address. Automated systems might spin up an ALE link and transfer the message automatically. Manual systems may simply display the "next hop" to the end user for link creation activities. Such "relay tables" might also include secondary and perhaps tertiary ALE addresses as well.

The routing and addressing format is one where familiar elements are used to indicate not only the route the message should take in a "tape relay" type communications circuit, but also the actual sender recipient(s) of the message. This combines the strengths of ACP-126 station to station communications with the strengths of ACP-127 tape relay communications into a single format which can be leveraged for both uses.

The CMF will leverage the generally accepted military network message protocol specified in the ACP-201 for it's basic formatting. ACP-201 provides sufficient leeway in it's specification to make CMF instantly compliant.

Basic CMF Formatting for Routing and Addressing

The CMF format for routing and addressing is combined into a familiar user@domain construct which is instantly familiar as a way to address Internet e-mails.

callsign@routing-indicator = the basic routing and addressing format which identifies both the sender and the recipient of the message.

Individual Station Addressing (ISA) combines both the station end point and it's routing indicator. This "uniquely" defines a station, by it's name and on which network end node it resides. The network designer and operations rules define an end point for the network. This end point may be a message drop station whereby any number of regionally related stations might find message addressed to their station.

Examples of Message Addressing

Station BLUE7 has a "home" routing indicator aof "UABCD". A message addressed to this station would appear as : "BLUE7@UABCD" in the CMF.

Group of Stations Addressing:

Station Group "REGION3" has a "home" routing indicator of "UAREG3". A message addressed to all stations in the station group would appear as : "REGION3@UAREG3" in the CMF

Broadcast Station Addressing:

Broadcast addresses could be sub-categorized, but in general, a broadcast address might appear as: "ALL@UAREG3" if all stations in Region 3 needed to be contacted.
Other examples : "STAFF@UAREG3", "MOG@UAREG3", etc.

Combining the addressing types in a single message would appear separated by the familiare " DE " syntax :

BLUE7@UABCD DE GREEN5@UABCE

The above formatting clearly defines to individual stations for origination and receipt.

ALL@UAREG3 DE BLUE7@UABCD

The above formatting shows an individual station BLUE7 addressing all stations in UAREG3

STAFF@UAREG3 DE OPS@UANHQ

The above formatting shows the operations staff at a national headquarters addressing the staff group of Region 3.

Multiple Addressing:

BLUE7@UAREG3 BLUE5@UAREG3 GREEN4@UAREG2 DE OPS@UANHQ

The national operations staff sends a message to three individual stations BLUE7, BLUE5 and GREEN4.

Message Origination Information and Other Information

There are other pieces of information which are either required or very helpful in record traffic transfer.

- Precedence – R = Routine, P = Priority, O = Immediate, Z = Flash
- Origination message number - #0123
- Origination date/time – 1232345 – Consists of Day of Origination Year followed by HH:MM time of day UTC.

Combining these data items with the routing and addressing is straightforward.

BLUE7@UABCD DE GREEN5@UABCE R #0123 1231234 //

UNCLAS

Text of message or USMTF message format content goes here.

// ACK 1234Z K

Where:
"//" is the header to content delimiter and the content to ending delimiter

"UNCLAS" represents the appropriate classification proword for the message

"ACK" is an optional area for short operating signals. Typically in the case of ACP-201 this is used for "ACK" or "+" to indicate that a response is required. The absence of this operating signal would be the NORM, and not the exception. For (semi-)automatic message operations, the "+" or "ACK" op signal could be used to indicate whether or not an automated system should reply immediately with a "ROGER" types message (QSL) when the message is transferred. In this way, informational or service messages would not clutter the circuit with "ACK" when not required. (In other words for "FYI" type messages, chats, etc.). Formal message traffic being routed SHOULD contain the "ACK" or "+" op signal in order to ensure that record traffic has been successfully and completely passed on the circuit.

"K" is the prosign for "OVER", and optionally "AR" the prosign for "OUT" might be employed to end a chat session or to end a one-way service message not requiring a response.

"1234Z" is the time stamp for when the message was actually transmitted on the circuit.

Other Assumptions and Considerations

All such PLAINDRESS communications should be carried out on an encrypted circuit.

All messages which require code group transmission (CODRESS) MAY be sent on a plain text circuit.

Since the basic addressing format includes the destination STATION as well as the route, a minor modification to the format would be to substitute "CODRESS" (or some other appropriate proword) for the station address in the addressing section.

CODRESS@UABCD DE CODRESS@UABCE R #0123 1231234 //

UNCLAS

DJWIOGHD ALDKRHEE ALDKGHDH DKIBYDND …

// ACK 1234Z K

Like a typical ACP-126/127 message, CODRESS formatting would have the final destination end point specified INSIDE the encrypted code groups rather than in the routing and addressing line. Also like ACP-127 tape relay, it is understood that the communications center handling the destination Routing Indicator would have the facilities to decrypt the code groups in order to facilitate final delivery.

A THIRD consideration is the development of a hybrid CODRESS format by which two end points may exchange code group encrypted messages. In this special case, the two address fields would again be used so that the end point may be easily identified.

BLUE7@UABCD DE GREEN4@UABCE R #0123 1231234 //

UNCLAS

DJWIOGHD ALDKRHEE ALDKGHDH DKIBYDND …

// ACK 1234Z K

In the case of CODRESS encrypted group content, it is suggested that the code groups themselves represent a FULLY routable/deliverable message utilizing the same CMF formatting. So when the code groups are deciphered, the output of the contend of a CODRESS@UABCD message would be a full CMF message. Taking the example immediately above the deciphered code groups might contain:

BLUE7@UABCD DE GREEN4@UABCE R #0123 1231234 //

UNCLAS
My message content

// ACK 1234Z K

The reason for this is so that a message may be code group encoded and passed across an non-secure circuit and the content be immediately machine/manually routed or delivered intact. This assumes that both ends of the non-secure circuit hold code group encryption/decryption facilities in common.

Appendix A – Message Examples

An ACP-127 formatted message requesting information from another station.

VZCZCMMM038
RR UABCD
DE UABCE #0103 2801834
ZNY EEEEE
R 071834Z OCT 2019
FM PLAIN LANGUAGE ADDRESS FOR GREEN4
TO UABCD/PLAIN LANGUAGE ADDRESS FOR BLUE7
BT
UNCLAS
MSGID/GENADMIN/PLAIN LANGUAGE ADDRESS FOR GREEN4/-//
SUBJ/PROVIDE WATER RESOURCE ESTIMATE//
AKNLDG/YES/BY RETURN MESSAGE//
GENTEXT/REMARKS/PROVIDE ESTIMATE OF ON HAND WATER RESOURCES. INDICATE IF RESOURCES WILL SUPPORT ALL PERSONNEL ON SITE FOR UP TO 7 DAYS FROM THIS DATE.//
BT
#0103

NNNN

A CMF formatted message containing the same information:

BLUE7@UABCD DE GREEN4@UABCE P #0443 2371422 //
UNCLAS
MSGID/GENADMIN/PLAIN LANGUAGE ADDRESS FOR GREEN4/-//
SUBJ/PROVIDE WATER RESOURCE ESTIMATE//
GENTEXT/REMARKS/Provide estimate of on hand water resources. Indicate if resources will support all personnel on site for up to 7 days from this date. //
// ACK 1503Z K

Note how all relevant addressing and origination information is contained on the first line.