Network Working Group   David H. Crocker
RFC: #735   Rand-ISD
NIC: #42083   (Dcrocker at Rand-Unix)
                                                 Richard H. Gumpertz
                                             Carnegie-Mellon University
                                                (Gumpertz at CMU-10A)

Obsoletes: RFC #729 (NIC #40306)   3 November 1977

                    Revised TELNET Byte Macro Option

1. Command name and code:

   BM 19

2. Command Meanings:

   IAC WILL BM

      The sender of this command REQUESTS or AGREES to use the BM
      option, and will send single data characters which are to be
      interpreted as if replacement data strings had been sent.

   IAC WON'T BM

      The sender of this option REFUSES to send single data characters
      which are to be interpreted as if replacement data strings had
      been sent. Any existing BM <macro byte> definitions are discarded
      (i.e., reset to their original data interpretations).

   IAC DO BM

      The sender REQUESTS or AGREES to have the other side (sender of
      WILL BM) send single data characters which are to be interpreted
      as if replacement data strings had been sent.

   IAC DON'T BM

      The sender REFUSES to allow the other side to send single data
      characters which are to be interpreted as if replacement data
      strings had been sent. Any existing BM <macro byte> definitions
      are to be discarded.

                                    1

     IAC SB BM <DEFINE> <macro byte> <count>
                                        <replacement string> IAC SE

        where:

            <macro byte> is the data byte actually to be sent across the
            network; it may NOT be Telnet IAC (decimal 255, but may be any
            other 8-bit character.

            <count> is one 8-bit byte binary number, indicating how many
            <replacement string> characters follow, up to the ending IAC
            SE, but not including it. Note that doubled IACs in the
            definition should only be counted as one character per pair.

            <replacement string> is a string of zero or more Telnet ASCII
            characters and/or commands, which the <macro byte> is to
            represent; any character may occur within a <replacement
            string>. Note, however, that an IAC in the string must be
            doubled, to be interpreted later as an IAC; to be interpreted
            later as data byte 255, it must be quadrupled in the original
            <replacement string> specification.

        The indicated <macro byte> will be sent instead of the indicated
        <replacement string>. The receiver of the <macro byte> (the sender
        of the DO BM) is to behave EXACTLY as if the <replacement string>
        string of bytes had instead been received from the network. This
        interpretation is to occur before any other Telnet
        interpretations, unless the <macro byte> occurs as part of a
        Telnet command; in this case no special interpretation is to be
        made. In particular, an entire Telnet subnegotiation (i.e. from
        IAC SB through IAC SE) is to be considered a Telnet command in
        which NO replacement should be done.

        The effect of a particular <macro byte> may be negated by resetting
        it to "expand" into itself.

        IAC SB BM <DEFINE> X <0> IAC SE may be used to cause X to be
        ignored in the data stream.

        <DEFINE> is decimal 1.

     IAC SB BM <ACCEPT> <macro byte> IAC SE

        The receiver of the <DEFINE> for <macro byte> accepts the
        requested definition and will perform the indicated replacement
        whenever a <macro byte> is received and is not part of any IAC
        Telnet command sequence.

                                    2

        <ACCEPT> is decimal 2.

    IAC SB BM <REFUSE> <macro byte> <REASON> IAC SE

        The receiver of the <DEFINE> for <macro byte> refuses to perform
        the indicated translation from <macro byte> to <replacement
        string> because the particular <macro byte> is not an acceptable
        choice, the length of the <replacement string> exceeds available
        storage, the length of the actual <replacement string> did not
        match the length predicted in the <count>, or for some unspecified
        reason.

        <REFUSE> is decimal 3.

        <REASON> may be

            <BAD-CHOICE>   which is decimal 1;

            <TOO-LONG>   (for receiver's storage) which is decimal
                                2;

            <WRONG-LENGTH>   (of actual string compared with promised
                                length in <count>) which is decimal 3; or

            <OTHER-REASON>   (intended for use only until this document
                                can be updated to include reasons not
                                anticipated by the authors) which is
                                decimal zero (0).

    IAC SB BM <LITERAL> <macro byte> IAC SE

        The <macro byte> is to be treated as real data, rather than as
        representative of the <replacement string>

        Note that this subcommand cannot be used during Telnet
        subcommands, since subcommands are defined to end with the next
        occurrence of "IAC SE". Including this BM subcommand within any
        Telnet subcommand would therefore prematurely terminate the
        containing subcommand.

        <LITERAL> is decimal 4.

    IAC SB BM <PLEASE CANCEL> <macro byte> <REASON> IAC SE

        The RECEIVER of the defined <macro byte> (i.e., the sender of IAC
        DO BM) requests the sender of <macro byte> to cancel its
        definition. <REASON> is the same as for the <REFUSE> subcommand.

The <macro byte> sender should (but is not required to) respond by
resetting <macro byte> (i.e., sending an IAC SB BM <DEFINE> <macro
byte> <1> <macro byte> IAC SE).

If the receiver absolutely insists on cancelling a given macro,
the best it can do is to turn off the entire option, with IAC DONT
BM, wait for an acknowledging IAC WONT BM and then restart the
option, with IAC DO BM. This will reset all other macroes as well
but it will allow the receiver to REFUSE with code BAD CHOICE
if/when the foreign site attempts to redefine the macro in
question.

3. Default:

   WON'T BM -- DON'T BM

   No reinterpretation of data bytes is done.

4. Motivation for the option:

   Subcommands for Telnet options currently require a minimum of five
   characters to be sent over the network (i.e., IAC SB <Option name>
   IAC SE). For subcommands which are employed infrequently, in absolute
   numbers and in relation to normal data, this overhead is tolerable.
   In other cases, however, it is not. For example, data which is sent
   in a block- oriented fashion may need a "block separator" mark. If
   blocks are commonly as small as five or ten bytes, then most of the
   cross-net data will be control information. The BM option is intended
   as a simple data compression technique, to remove this overhead from
   the communication channel.

5. Description of the option

   The option is enabled through the standard Telnet Option negotiation
   process. Afterwards, the SENDER of data (the side which sends the IAC
   WILL BM) is free to define and use mappings between single and
   replacement NVT characters. Except for the ability to refuse
   particular definitions, the receiver of data has no control over the
   definition and use of mappings.

   The sender (of the WILL BM) is prohibited from using or redefining a
   <macro byte> until it has received an <ACCEPT> <REFUSE>, or DONT BM,
   in reply to a <DEFINE>.

   NOTE: The Telnet command character IAC (decimal 255) may be a member
   of a <replacement string> but is the ONLY character which may NOT be
   defined as a <macro byte>.

Within any Telnet command (i.e., any sequence beginning with IAC)
macro replacement may NOT take place. Data are to be interpreted only
as their normal character values. This avoids the problem of
distinguishing between a character which is to be taken as a <macro
byte>, and interpreted as its corresponding <replacement string>, and
one which is to be taken as its usual Telnet NVT value. In all other
cases, however, <macro byte>s are to be interpreted immediately, as
if their corresponding <replacement string>s had actually been sent
across the network. Expanded strings are not subject to
reinterpretation, so that recursive definitions cannot be made.
Telnet commands may be included in <replacement strings>; however,
they must be totally contained within the macro or must begin within
the macro and terminate outside of it. In particular, they may NOT
begin outside a macro and continue or terminate inside one, since no
macro replacement takes place while processing any Telnet command.

Note that when skipping data due to Telnet SYNCH (INS/DM) processing,
BM macro replacement should still take place, since (for example)
"IAC DM" would be a valid <replacement string>.

The <count> in the <DEFINE> subcommand is intended to allow the
receiver to allocate storage. IAC interpretation is not over-ridden
during BM subcommands so that IAC SE will continue to safely
terminate malformed subcommands.

The BM option is notably inefficient with regard to problems during
<macro byte> definition and use of <macro byte>s as real data. It is
expected that relatively few <macro byte>s will be defined and that
they will represent relatively short strings. Since the Telnet data
space between decimal 128 and decimal 254 is not normally used,
except by implementations employing the original (obsolete) Telnet
protocol, it is recommended that <macro byte>s normally be drawn from
that pool.