# United States Court of Appeals for the Federal Circuit

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**ERICSSON INC., TELEFONAKTIEBOLAGET LM ERICSSON,**
*Appellants,*

**v.**

**INTELLECTUAL VENTURES I LLC,**
*Appellee*

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2017-1521

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Appeal from the United States Patent and Trademark Office, Patent Trial and Appeal Board in No. IPR2015-01367.

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Decided: August 27, 2018

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STEVEN GARRETT SPEARS, Baker & Hostetler LLP, Houston, TX, argued for appellants. Also represented by GREGORY MATTHEW MCCLOSKEY, Cesari and McKenna, LLP, Boston, MA.

BYRON LEROY PICKARD, Sterne Kessler Goldstein & Fox, PLLC, Washington, DC, argued for appellee. Also represented by LORI A. GORDON.

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Before REYNA, TARANTO, and CHEN, *Circuit Judges.*

REYNA, *Circuit Judge.*

Ericsson Inc. and Telefonaktiebolaget LM Ericsson appeal the final written decision of the U.S. Patent and Trademark Office's Patent Trial and Appeal Board, finding that claims 1–3, 6–9, and 12–14 of U.S. Patent No. 5,602,831 are not unpatentable under 35 U.S.C. § 103. Because we conclude that the Board improperly did not consider portions of Ericsson's Reply, we vacate and remand.

## I. THE '831 PATENT

Appellee Intellectual Ventures I LLC ("Intellectual Ventures") owns U.S. Patent No. 5,602,831 ("the '831 patent"), entitled "Optimizing packet size to eliminate effects of reception nulls." The '831 patent expired on March 31, 2015.

The '831 patent is directed to increasing the reliability of a wireless communications system when a wireless receiver is moving by minimizing the effects of burst errors that occur at the receiver. '831 patent, Abstract; *id.* col. 1 ll. 5–8. The moving wireless communications devices disclosed in the '831 patent transmit information via packets containing bits of information. Signal fading or signal drop-outs result in transmission errors in which some or all of the bits in the packet are not successfully received by the receiver. The '831 patent refers to these transmission errors as "burst errors" or "nulls." *Id.* col. 1 ll. 23–29. Although nulls occur randomly, they can be predicted based on various signal drop characteristics, such as the speed the receiver is moving. For instance, at slow speeds, nulls are generally wider and the amount of time between nulls is longer, whereas at higher receiver speeds, the nulls are narrower and occur more frequently. *See id.* col. 2 ll. 24–28.

The '831 patent describes various techniques in the prior art for reducing the effects of burst errors and nulls,

including error correction techniques, retransmission, transmitting over multiple frequencies, and using multiple transmitter stations in various locations. *Id.* col. 1 l. 35–col. 2 l. 11. The patent further notes that "[a]nother technique for reducing the effects of burst errors involves interleaving multiple message packets together thus creating better burst error correction capabilities." *Id.* col. 2 ll. 4–6. Interleaving is a coding technique by which data is read into a two-dimensional register (e.g., columns of characters) column-by-column, and then read out of the register row-by-row. J.A. 4. Interleaving multiple packets spreads out the effect of errors due to signal drops, such that any dropped signal will, at most, create only a loss of a small portion in each packet, rather than the loss of an entire packet. Regarding the prior art, the '831 patent notes that the efficacy of interleaving in reducing the effects of burst errors for portable receivers is limited when the size of the interleaved packet does not change: "transmitting a single interleaved packet size for varying signal drop-out conditions is not completely effective in minimizing burst error effects." '831 patent col. 2 ll. 4–11.

The '831 patent discloses new methods of mitigating the effects of signal drops, specifically by encoding packets into packet blocks by interleaving the packets together into a register, and varying the number of packets encoded into each packet block according to signal drop characteristics, such as the speed at which the receiver is moving. *Id.* col. 2 ll. 17–21, 34–48. Because of the interleaving, any burst errors are distributed between all packets in the packet block, which can then be decoded more easily. *Id.*, Abstract; *id.* col. 7 ll. 17–38. The '831 patent makes clear that the technique of "interleaving" was known in the art:

> *Interleaving packets together is known in the art.* However, varying the number of bytes in each packet interleaved together according to re-

> ceiver speed is novel and provides substantial advantages over existing interleaving techniques.
>
> Explaining further, the interleaving process discussed above increased the number of bytes in each packet successfully received by the receiver. However, if the speed of motion of the receiver changes, the signal drop-out characteristics also change as previously shown in FIGS. 3-5. Thus, the packet block size shown in FIG. 9 (9 packets) may not improve reception reliability at a new receiver travel speed.
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> . . . .
>
> To prevent more than one burst error (null) from occurring in any one packet block, the transmitter again adjusts the packet block size according to the new travel speed of the receiver.

*Id.* col. 6 l. 42–col. 7 l. 26 (emphasis added).

Claims 1 and 9 are the independent claims and, for purposes of this appeal, are illustrative:

> 1. A method for transmitting a message packet to a receiver, comprising:
>
> identifying changes in signal drop-out characteristics each associated with the receiver;
>
> encoding packets into packet blocks;
>
> transmitting each packet block to the receiver; and
>
> varying the number of packets encoded in the packet block according to the changes in the signal drop-out characteristics.
>
> 9. A system for transmitting messages, comprising:

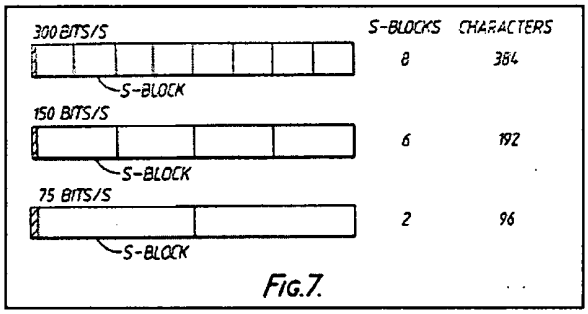
> a receiver having a variable speed of motion, the receiver receiving packet blocks containing the messages;
>
> a transmitter for transmitting the packet blocks to the receiver; and
>
> an encoder for combining and varying the number of packets transmitted in each of the packet blocks according to the variable speed of the receiver.

*Id.* col. 8 ll. 47–55, col. 9 ll. 27–34.

## II. PRIOR ART

### A. Reed

U.S. Patent No. 4,939,731 ("Reed") describes a data transmission protocol in which data signals are transmitted as a data packet. Each packet includes one or more blocks of data, called "send blocks" or "S-blocks," each encoded with an error correcting code, or "codeword." The exact number of S-blocks within each data packet depends on the baud rate in use—i.e., as baud rate increases, the number of S-blocks increases, as shown in Figure 7 below:




J.A. 906.

The codewords are further divided into numbered "Repetition blocks," referred to as R-blocks. R-blocks can be concatenated with additional codewords to create an S-block. Reed describes how, during transmission, a data

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