# Wireless Data Transmission with Efficient Radio Resource Usage

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## ABSTRACT

Researchers at the University of California, Davis have developed a robust header compression (ROHC) system to enable internet protocol data transmission with efficient radio resource usage over a wireless communication link.

## FULL DESCRIPTION

Internet protocol data constitute much of today's wireless traffic. Typically, cellular wireless networks transmit user information by dividing it into a sequence of packets with headers so that the receiver knows how to handle/interpret the data. Full headers in packet transmissions are very inefficient. Headers in successive packets are often highly correlated so the transmitter can compress while the receiver is able to decompress subsequent header based on the context from the previous header. However, as wireless channels are not error-free, the compressor in the transmitter cannot always send compressed headers, which would otherwise cause the decompressor in the receiver to lose context synchronization in case of consecutive packet losses, resulting in the inability to decompress successfully received headers. In unidirectional ROHC, the state of the decompressor cannot be directly observed by the compressor and thus the compressor must adjust the compression level autonomously and thus is less reliable. On the contrary, bidirectional ROHC uses a feedback channel so that the decompressor can communicate its context with the compressor. However, the frequent feedback from the decompressor to the compressor can be costly, and existing bidirectional ROHC schemes have a rigid feedback rate that cannot address the trade-off between compression efficiency and feedback.

Researchers at the University of California, Davis have developed a robust header compression (ROHC) system to enable data transmission with efficient radio resource usage over a cellular communication link. Substantially improving existing cellular header compression, this new invention can adaptively adjust compression level and request sporadic feedback based on trans-layer information collected from the RLC/MAC/PHY layer entities in the transmitter with an underlying partially observable Markov decision process model. The invention achieves flexible trade-off between transmission reliability/efficiency and feedback overhead. In addition, this new system requires few changes to other layers of the protocol stack, and therefore can be easily integrated into existing packet-switched wireless communication systems.

## APPLICATIONS

- High volume IP data transmission with efficient radio resource usage over a packet-switched wireless communication link composed of a transmitter, a receiver and the channel between them

## FEATURES/BENEFITS

- Substantial improvement of data payload rate and efficiency of radio resource usage for the wireless packet transmissions
- Flexible trade-off between transmission efficiency and feedback overhead
- Easy and standalone upgrade of only header compression operations without altering the state-of-art cellular network protocols

## PATENT STATUS

| Country | Type | Number | Dated | Case |
|---|---|---|---|---|
| United States Of America | Issued Patent | 11,019,530 | 05/25/2021 | 2017-765 |

## ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Cross-Layer Robust Header Compression (ROHC) Compressor Design
- Deep Learning Network and Compression Framework over Limited Bandwidth Network Links

**INVENTORS**

- Ding, Zhi
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## OTHER INFORMATION

**KEYWORDS**

ROHC, header compression, transmission efficiency, adaptive feedback, wireless communication, bidirectional, trans-layer design, POMDP

**CATEGORIZED AS**

- Communications
- Wireless

**RELATED CASES**

2017-765-0

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