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July 2001

Media Link Parameters for ROHC
draft-minaburo-parameters-00.txt

Status of this memo

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Abstract

This document describes a negotiation suboption to bring some media link parameters to be used in the robust IP/UDP/RTP header compression developed by the ROHC WG [ROHC]. This document is based on the ROHC framework documents and the 3GPP documents.

1. Introduction

ROHC is a mechanism created to work well in links with special characteristics [ROHC]. The mechanism uses some parameters to make the compression and the decompression. The values of these parameters are given by the characteristics of the media link.

These parameters will be used for the development of the compression and decompression processes. The knowledge of the media link state is required in the two first operation modes, in the compressor, it allows a better level of confidence at compressor. In the decompressor, it is used to estimate the values of the failure detection rule [ROHC].

The media link parameters are assumed to be known in the peers of the network. In a cellular network, they change constantly and are always retransmitted in both directions.

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119.

2. Control Parameters

The coexistence of two networks technologies (cellular and IP networks) requires some specific considerations. One of them is taking into account the frequent degradation of the QoS and its variations. The control procedure MUST be a continuous request of parameters between the IP layer and the media layer.

The control procedure is used in all the profiles accepted by [ROHC]. These parameters are classified in media and CSV (Compression State Variation).

2.2 Media parameters

The main distinguish factors in the media parameters are the bit error rate and how delay sensitive the traffic. The control procedure in ROHC MUST be based on different characteristics given by the media link state.

The QoS parameters are described in the [TR23.107] for the cellular networks, where its attributes determine the characteristics of the cellular link.

2.2.1 Media link QoS Parameters

BER (Bit Error Rate): This information can give the reliability of the link and also set internal parameters of ROHC. The different reliability levels of the cellular link give the BER value.

4 bits represent the values of the residual BER. The values of the following table are taken from [TS24.008]. The values range defined for the cellular links is from 5*10-2 to 6*10-8. The missing ones are not used.

Bits 1 2 3 4	Value
0 0 0 1	5*10-2
0 0 1 0	1*10-2
0 0 1 1	5*10-3
0 1 0 0	4*10-3
0 1 0 1	1*10-3
0 1 1 0	1*10-4
0 1 1 1	1*10-5
1 0 0 0	1*10-6
1 0 0 1	6*10-8
1 1 1 1	Reserved

All the values that are not explicitly defined will be mapped to one of the values specified. If the value is in the middle of two, the media link will use the next upper.

TD (Transfer Delay): This give an approximate value of the half RTT (Round Trip Time) in the cellular link. The values of TD are also in the [TS24.008] which give a range of values in each category of transfer delay.

Bits 1 2 3 4 5 6	Values
0 0 0 0 0 1	The Transfer delay is binary coded in 6 bits, using a granularity of 10 ms
0 0 1 1 1 1	Giving a range of values from 10 ms to 150 ms in 10 ms increments
0 1 0 0 0 0	The transfer delay is 200 ms + ((the binary coded value in 6 bits - 010000) * 50 ms)
0 1 1 1 1 1	Giving a range of values from 200 ms to 950 ms in 50ms increments
1 0 0 0 0 0	The transfer delay is 1000 ms + ((the binary coded value in 6 bits - 100000) * 100 ms)
1 1 1 1 1 0	Giving a range of values from 1000 ms to 4100 ms in 100ms increments

1 1 1 1 1 1 Reserved

2.3 CSV parameters

The CSV parameters are the "k_out_of_n_failures" detection rule and the L value from [ROHC].

The Decompression logic in the [ROHC] proposition use the "k_out_of_n_failures" rule. This rule is based on the bit error rate and link round trip time. As these values are assumed to be known for the radio link, the parameters k and n of [ROHC] can be estimated.

Using the BER and TD, the compressor estimates how many packets will be damaged in our link in a period of time. This give us the L parameter [ROHC] that means how many times the compressor MUST stay in a compression level until it is fairly confident.

The L parameter is used for the "Optimistic approach" [ROHC] in ROHC Unidirectional and Bidirectional Optimistic modes of operation. Knowing the state of the link, the number of updates are defined in order to have a confident level at compressor.

2.4 CSV Procedure Description

The control procedure MAY consists of an information exchange among the media link and ROHC decompressor. The procedure take place for the first time after the negotiation if the CSV negotiation suboption is requested. The control variables are updated through a request made by the decompressor every period of time that COULD be 0.5 seconds for the cellular networks. When the decompressor have these values, it is possible to determine the CSV parameters values and the best mode of operation.

In the cellular network, a terminal estimates the radio parameters of the received link [TS25.302]. These values are transmitted to the other peer.

The control procedure takes place in parallel of the ROHC mechanism, figure 2.4, it is used for the decompressor to know better the link state. In order to make the compression/decompression, the decompressor will wait for the media link reply. The ROHC decompressor will generate automatically a request-reply procedure each period of time to update the CSV parameters.

Figure 2.4 Control Procedure

```
+-+-+-+-+-+-+                 +-+-+-+-+-+-+-+-+       +-+-+-+-+-+-+-+
|Compressor | --------------> | Decompressor| <---> | CSV Proc. |
+-+-+-+-+-+-+                 +-+-+-+-+-+-+-+-+       +-+-+-+-+-+-+-+
     ^                                |                     ^
```

```
       |_______________________________|                    |
                Feedback {k,n,l}                            v
                                                    QoS Parameters
```

If the values have changed, the decompressor will send a feedback packet to the compressor to update the values.

3. CSV Control Procedure Negotiation Suboption

The option to run the CSV procedure is subject to negotiation. The compressor/decompressor can have the option to compute their parameters based on the QoS media layer parameters.

Description

Define the use of the CSV parameters by the decompressor.

Figure 3: CSV control procedure negotiation suboption

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|     Type      |    Length     | CSV Control Procedure             |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Type
2

Value
c025 (hex) for non cellular networks
c0XX (hex) to be assigned for cellular networks

4. CSV Feedback option format

The CSV Feedback option has the values of the three CSV parameters (k, n, L). The CSV parameters are send through a feedback option to the compressor only when there is a change in this CSV parameters set.

Figure 4: CSV feedback option

```
  0   1   2   3   4   5   6   7
+---+---+---+---+---+---+---+---+
|Option Type|  Opt Len  |
+---+---+---+---+---+---+---+---+
|            k          |
+---+---+---+---+---+---+---+---+
|            n          |
+---+---+---+---+---+---+---+---+
|            L          |
+---+---+---+---+---+---+---+---+
```

Option Type = 8
Option Length = 3

When receiving a CSV option, the compressor updates its variable L, and robustness will be increased as "optimistic approach" is based in the actual state of the link (used in the Bidirectional Optimistic Mode of operation).

5. Unidirectional mode of operation

When working in Unidirectional Mode the CSV procedure has to be done in both peers, then each one, compressor and decompressor will create the CSV parallel procedure to determine its own parameters.

There will not be a feedback option to update the values, each peer will update the CSV parameters each period of time. Then when the decompressor ask to work in Bidirectional Optimistic Mode the compressor leave the CSV procedure and wait the feedback option update.

6. Security Considerations

The security considerations of ROHC [ROHC] apply.

The use of header compression can, in rare cases, cause the misdelivery of packets. If necessary, confidentiality of packet contents should be assured by encryption.

Encryption applied at the IP layer (e.g., using IPSEC mechanisms) precludes header compression of the encrypted headers, though compression of the outer IP header and authentication/security headers is still possible as described in [ROHC]. For RTP packets, full header compression is possible if the RTP payload is encrypted by itself without encrypting the UDP or RTP headers, as described in [RFC1889]. This method is appropriate when the UDP and RTP header information need not be kept confidential.

7. IANA considerations

The ROHC suboption identifier is a non-negative integer. Following the policies outlined in [IANA-CONSIDERATIONS], the IANA policy for assigning new values for the suboption identifier shall be Specification Required: values and their meanings must be documented in an RFC or in some other permanent and readily available reference, in sufficient detail that interoperability between independent implementations is possible. The range 0 to 127 is reserved for IETF standard-track specifications; the range 128 to 254 is available for other specifications that meet this requirement (such as Informational RFCs). The value 255 is reserved for future extensibility of the present specification.

8. References

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