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Proposal:

A NOVEL TRANSMISSION AND TRANSPORT CHANNEL MULTIPLEXING SCHEME FOR WCDMA

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Summary:

This document describes the new transmission and transport channel multiplexing scheme that can be used in WCDMA system. In the proposed scheme, the TFCI bits in the DPCCH frame indicate a certain combination of bit rates of the DCHs multiplexed in the next DPDCH frame. Compared with the conventional one, if the new transmission structure is adopted, the receiver complexity can be reduced a lot and the service quality can get improved greatly. By the way, we put forward several transport channels multiplexing scheme as examples in this document.

1. INTRODUCTION

In the 3rd generation mobile communication system users can be provided with multimedia service, i.e. for a single user there can exist simultaneous speech, data and/or image services. And the demand of user services is arbitrary i.e. another service may be added/removed at any time when a service is being employed. In the document of TS S1.11 V2.0.0 the transport-format combination indicator (TFCI) carried by the DPCCH informs the receiver about the instantaneous parameters of different transport channels multiplexed on the DPDCH and corresponds to the data transmitted in the same frame. There are 32 encoded TFCI bits per frame not only for default TFCI but also for extended TFCI and they are divided evenly among the 16 time slots, thus 2 bits per slot. So we must store one DPDCH frame when despreading the DPDCH according to the above conventional transmission structure, thus the receiver complexity is augmented and the performance for the low delay service is deteriorated. By the way, in the document of TS S1.12 V2.0.0 the details for the transport channel multiplexing is not mentioned. For the things above, we propose a novel transmission and transport channel multiplexing scheme for WCDMA system.

2. OUR TRANSMISSION AND TRANSPORT CHANNEL MULTIPLEXING SCHEME

Fig. 1 shows the transmission structure of uplink in WCDMA systems of Europe and Japan. Each frame of length 10ms is split into 16 slots ,each of length 0.625 ms. The DPDCH and the DPCCH are I/Q code multiplexed within each radio frame. The exact number of bits of the different uplink DPCCH fields in Figure 1 is yet to be determined and the field order is fixed. The transmission structure of downlink in WCDMA systems of Europe and Japan is alike.

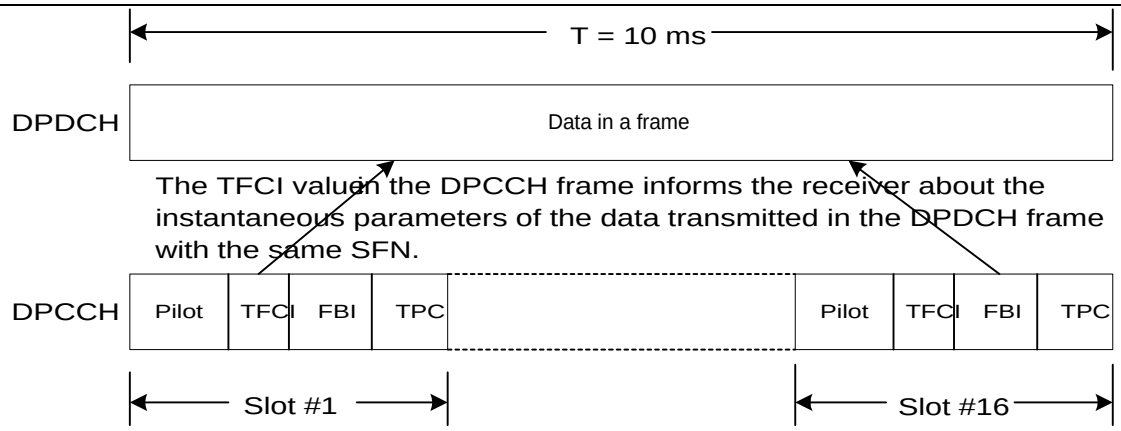
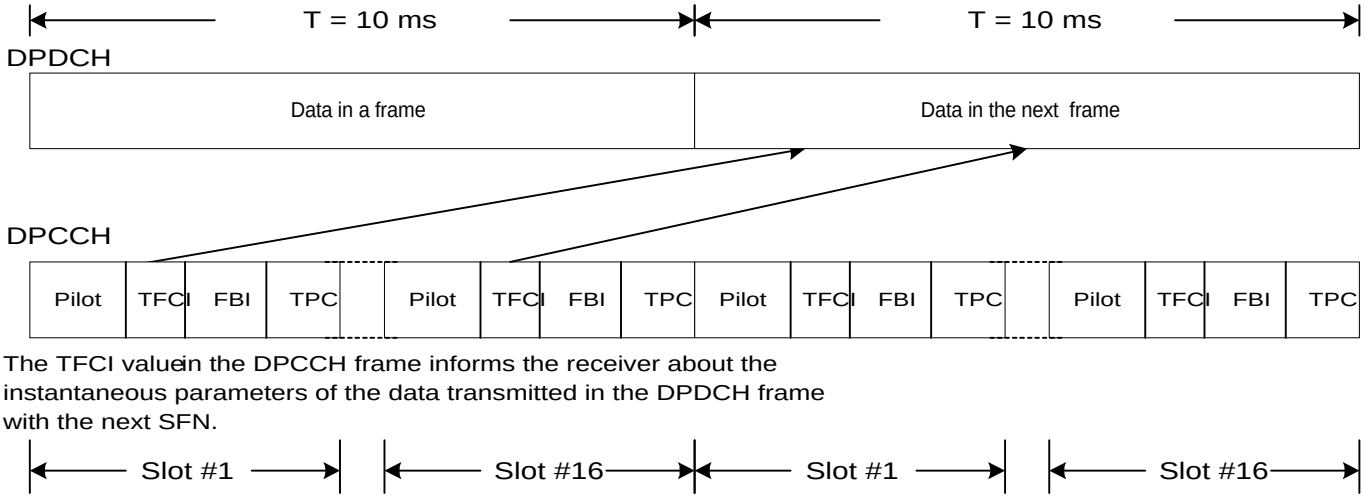


Fig.1 Transmission structure for uplink dedicated physical channel

Fig. 2 shows our transmission structure of uplink for WCDMA system. For a certain user, firstly an idle frame without data in the DPDCH is transmitted at connection set up and at this moment the TFCI bits carried in the DPCCH frame with the SFN 1 indicate the dedicated transport channel multiplexing in the DPDCH frame with the SFN 2. So in our scheme, the TFCI bits in the DPCCH frame always indicate a certain combination of bit rates of the DCHs multiplexed in the next DPDCH frame. If the new transmission structure is adopted, the receiver don't need to store a DPDCH frame when despreading the DPDCH, thus compared with the conventional one the receive complexity can be



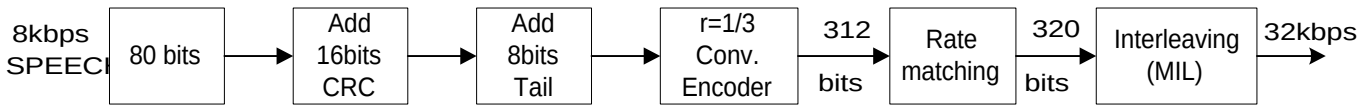
reduced a lot and the quality for the low delay service can get improved. The transmission structure of downlink in our scheme is alike.

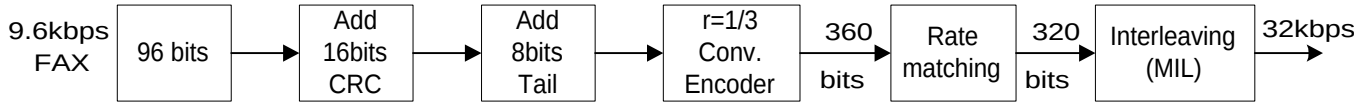
Fig.2 Transmission structure for uplink dedicated physical channel in our scheme

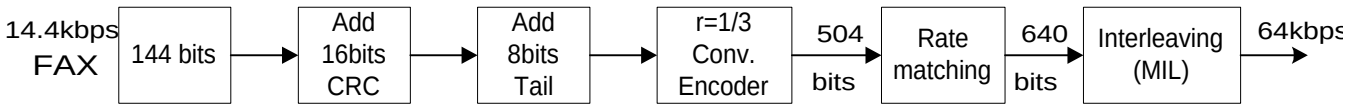
In the WCDMA system the dedicated channel (DCH) corresponds to the three channels Dedicated Traffic Channel (DTCH), Stand-Alone Dedicated Control Channel (SDCCH), and Associated Control Channel (ACCH) defined within ITU-R M.1035. But in the document of TS S1.12 V2.0.0 the details for the transport channel multiplexing is not mentioned. We propose our transport channel multiplexing scheme for several common services. In our scheme we propose to regard the attendant signaling as a certain service. The multiplexing of the attendant signaling and the DCHs carrying user services currently in use is indicated with the TFCI value, i.e. the TFCI value also indicates whether there is the attendant signaling or not and the bit rates of the attendant signaling multiplexed in the next DPDCH frame.

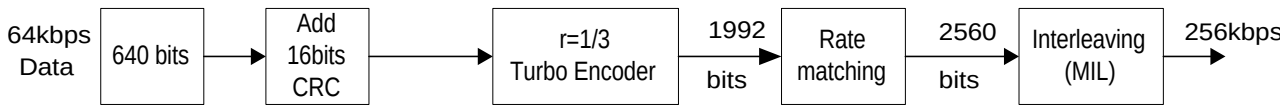
In the following we give the transmission scheme of several common services as examples (without attendant signaling). For the Uplink DPCCH its transmission is the same as the transmission structure in the TS S1.11 V2.0.0. In

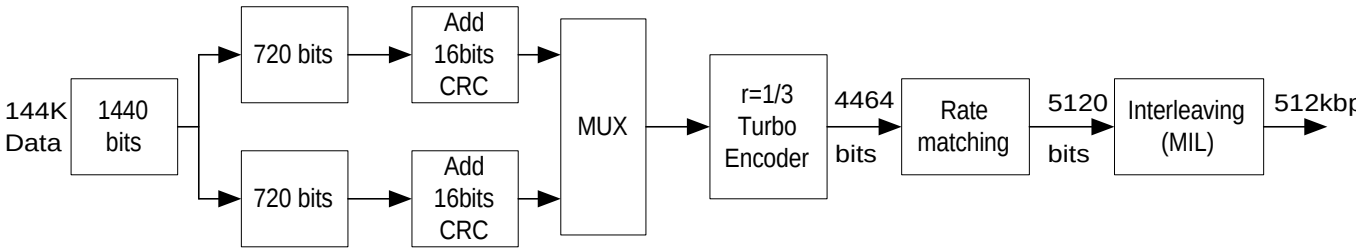
our scheme the transmission time interval may be transport-channel specific from the set {10ms, 20ms, 40ms, 80ms}. The following structure is a example which transmission time interval is 10ms. The rate matching algorithm is the same as the one in the document of TS S1.12 V2.0.0.

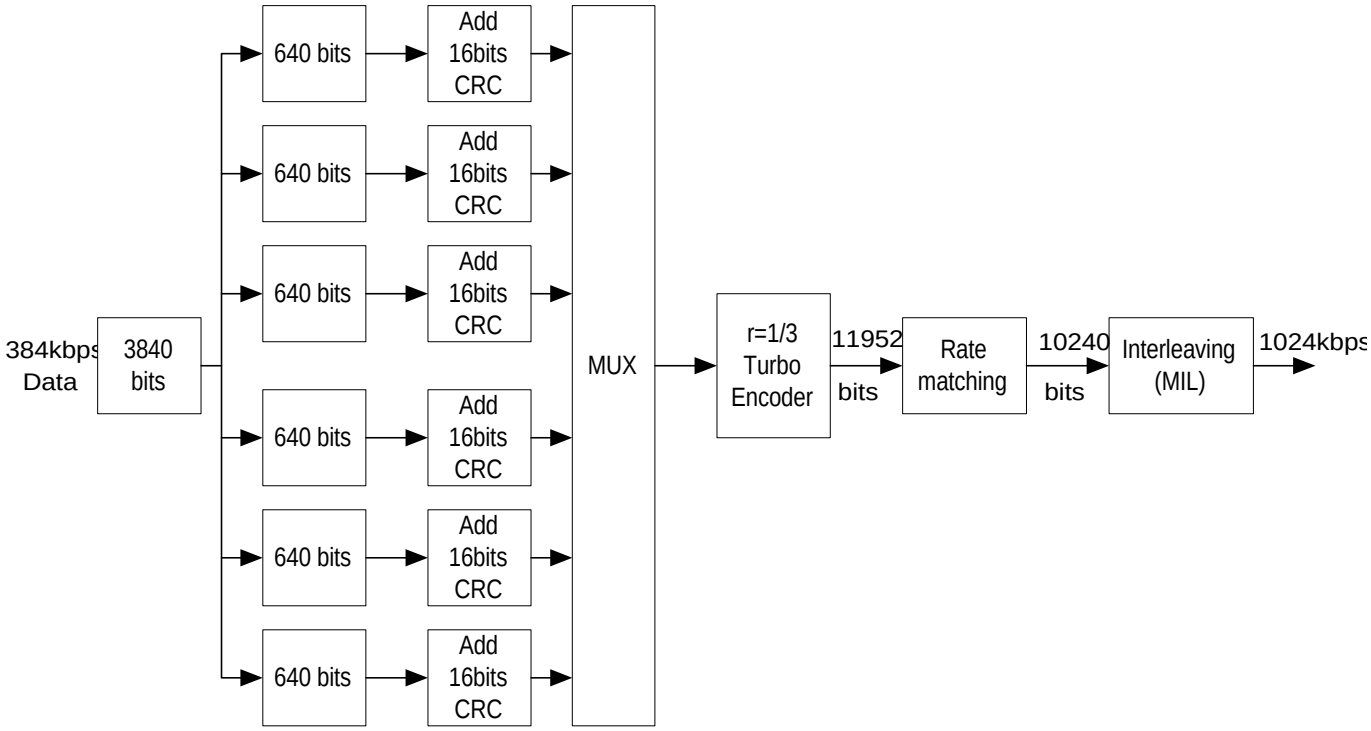


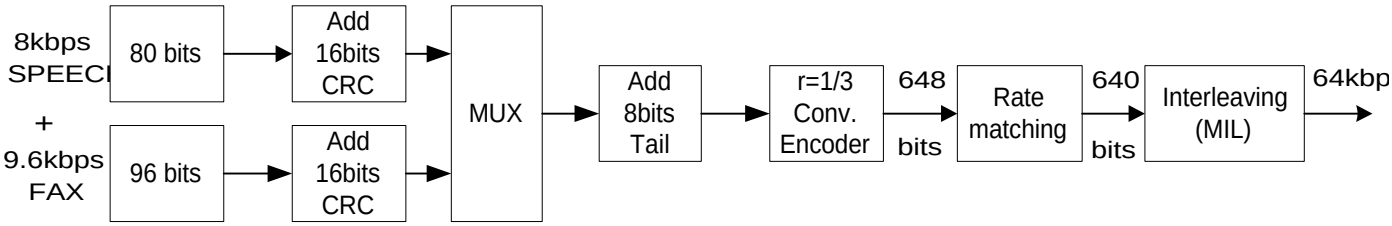


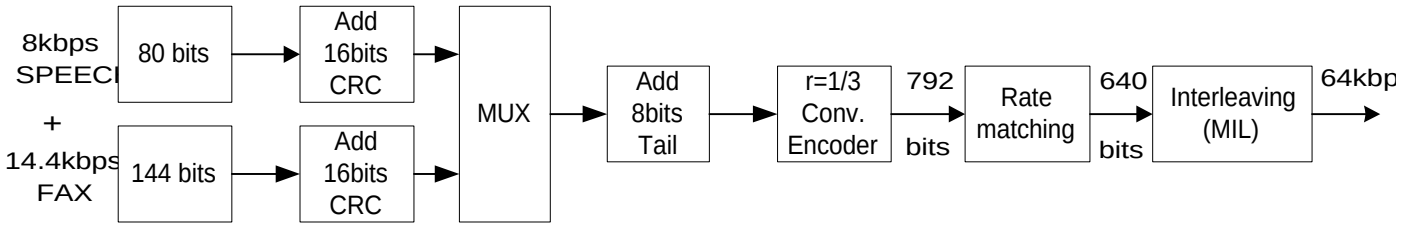







384kbps
Data
3840
bits
640 bits
640 bits
640 bits
640 bits
640 bits
640 bits
Add
16bits
CRC
MUX
r=1/3
Turbo
Encoder
11952
bits
Rate
matching
10240
bits
Interleaving
(MIL)
1024kbps


8kbps
SPEECH
+
9.6kbps
FAX
80 bits
96 bits
Add
16bits
CRC
MUX
Add
8bits
Tail
r=1/3
Conv.
Encoder
648
bits
Rate
matching
640
bits
Interleaving
(MIL)
64kbp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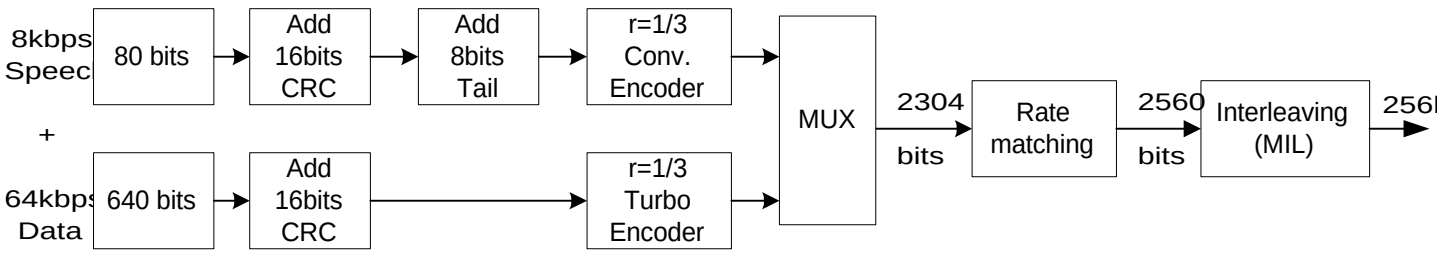
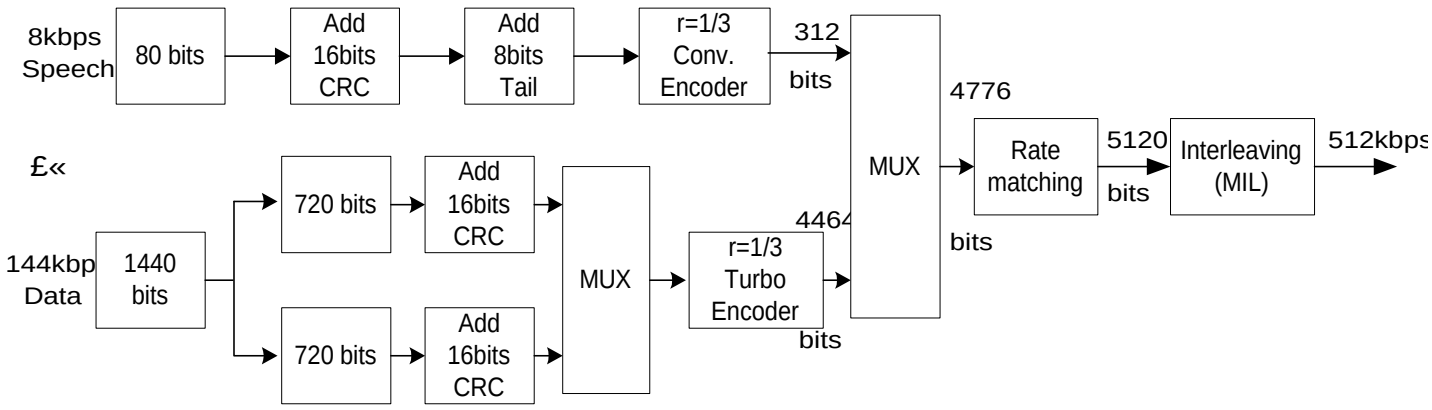
SPEECH
+
14.4kbps
FAX
80 bits
144 bits
Add
16bits
CRC
MUX
Add
8bits
Tail
r=1/3
Conv.
Encoder
792
bits
Rate
matching
640
bits
Interleaving
(MIL)
64kbp


8kbps
Speech
+
64kbps
Data
80 bits
640 bits
Add
16bits
CRC
Add
16bits
CRC
Add
8bits
Tail
r=1/3
Conv.
Encoder
r=1/3
Turbo
Encoder
MUX
2304
bits
Rate
matching
2560
bits
Interleaving
(MIL)


8kbps
Speech
80 bits
Add
16bits
CRC
Add
8bits
Tail
r=1/3
Conv.
Encoder
312
bits
£«
144kbp
Data
1440
bits
720 bits
720 bits
Add
16bits
CRC
Add
16bits
CRC
MUX
r=1/3
Turbo
Encoder
4464
bits
MUX
4776
bits
Rate
matching
5120
bits
Interleaving
(MIL)
512kbps

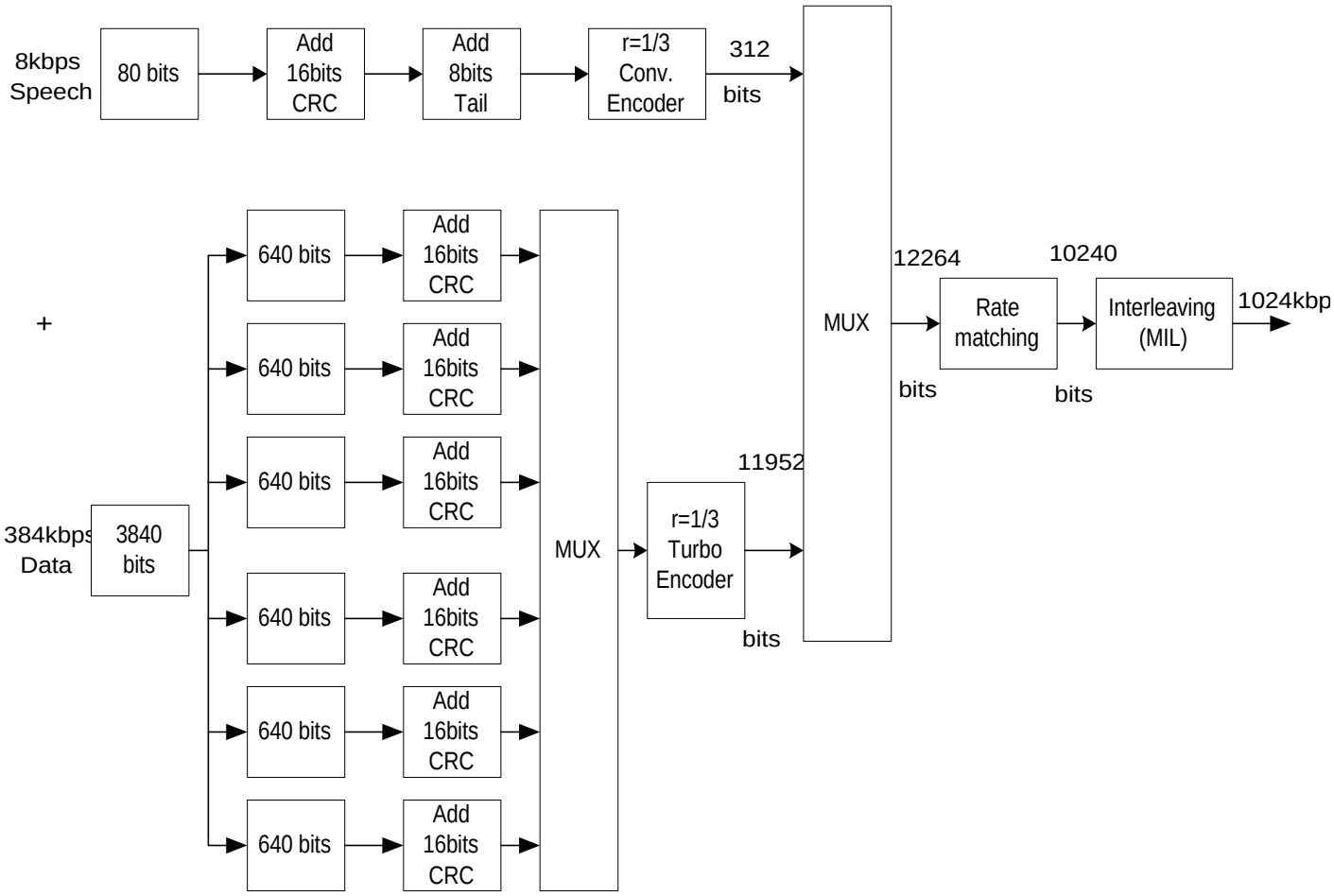


Fig.3 Our transmission scheme for uplink dedicated physical data channel