6.3.2 Downlink Physical layer design

<…>

6.3.2.5.2 N-BCCH

Four N-BCCH blocks with payload size of 19 bytes for each provide sufficient capacity to broadcast all the required system information messages required for CIoT as described above. Encoding details for the BCCH data block are listed in Table 6.3.2.5-2:

Table 6.3.2.5-2: Data block encoding for N-BCCH

N-BCCH Coding parameters	Size [bits]
Payload	152
CRC	18
Tail bits	6
Input bits for channel coding	176
Convolutional coding	1/3
Encoded Bits	528
Puncturing	80
Constraint Length	7

The interleaving and burst mapping for N-BCCH is different from CS1 because the bits need to be mapped on the radio block over 16 bursts compared to 4 bursts for CS1 encoding.

Tail bits:

Six tail bits equal to 0 are added to the 170 information bits, the result being a block of 176 bits {u(0),u(1),...,u(175)}:

u(k) = d(k) for k = 0,1,...,169

u(k) = 0 for k = 170, ..,175 (tail bits)

Convolutional encoder:

This block of 176 bits {u(0),u(1),...,u(175)} is encoded with the 1/3 rate convolutional mother code defined by the polynomials:

$G4 = 1 + D^2 + D^3 + D^5 + D^6$
$G5 = 1 + D + D^4 + D^6$
$G6 = 1 + D + D^2 + D^3 + D^4 + D^6$
This results in a block of 528 coded bits: {C(0),C(1),...,C(527)} defined by:

C(3k) = u(k) + u(k-2) + u(k-3) + u(k-5) + u(k-6)
C(3k+1) = u(k) + u(k-1) + u(k-4) + u(k-6)
C(3k+2) = u(k) + u(k-1) + u(k-2) + u(k-3) + u(k-4) + u(k-6) for k = 0,1,...,175
u(k) = 0 for k < 0

Puncturing:

The code is punctured in such a way that the following 80 coded bits

C(23+5j) for j = 0,1,...,79

are not transmitted. The result is a block of 448 coded and punctured bits, P(0)...P(447).

Interleaving:

The encoded bits are interleaved over 16 N-BCCH bursts as per the below interleaving scheme.

```
for (k= 0 to 447)
{
  B=mod(12*k+floor(k/2)+mod(k,2),16);
   j=mod(23*mod(5*k,28)+ floor(7*k/16),28);
}
```