

## Annex 74A

(informative)

### FEC block encoding examples

This Annex provides an example FEC block encoding with (2112, 2080) code. See Table 74–1 for the format of the FEC block. The length of the FEC block is 2112 bits. Each FEC block contains 32 rows of 65 bits each; 64 bits of payload and 1 bit transcoding overhead (T bits). At the end of each block there is 32-bit overhead or parity check bits.

#### 74A.1 Input to the FEC (2112, 2080) Encoder

The Table 74A–1 provides an example 64b/66b block stream at the input to the FEC (2112,2080) encoder. The example shows a stream of 32 64b/66b symbols generated from the output of PCS layer when the link was sending out IDLE symbols. The transmission is from left to right within each row and from top to bottom between rows. The first bit out on the wire starts at the top left hand corner. Note that there is both binary representation and hexadecimal symbol representation in the table, in case of the hex symbol, the most significant bit of the hex symbol is sent first.

**Table 74A–1— 64b/66b block stream**

Sync [0:1]	64 bit payload hex [0:63]	Sync [0:1]	64 bit payload hex [0:63]	Sync [0:1]	64 bit payload hex [0:63]	Sync [0:1]	64 bit payload hex [0:63]
10	40ea1e77eed301ec	10	ad5a3bf86d9acf5c	10	de55cb85df0f7ca0	10	e6ccff8e8212b1c6
10	d63bc6c309000638	10	70e3b0ce30e0497d	10	dc8df31ec3ab4491	10	66fb9139c81cd37b
10	b57477d4f05e3602	10	8cfd495012947a31	10	e7777cf0c6d06280	10	44529cf4b4900528
10	85ce1d27750ad61b	10	456d5c71743f5c69	10	c1bf62e5dc5464b5	10	dc6011be7ea1ed54
10	1cf92c450042a75f	10	cc4b940eaf3140db	10	77bb612a7abf401f	10	c22d341e90545d98
10	ce6daf1f248bbd6d	10	dd22d0b3f9551ed6	10	574686c3f9e93898	10	2e52628f4a1282ce
10	f20c86d71944aab1	10	55133c9333808a2c	10	1aa825d8b817db4d	10	637959989f3021eb
10	976806641b26aae9	10	6a37d4531b7ed5f2	10	53c3e96d3b12fb46	10	528c7eb8481bc969

#### 74A.2 Output of the FEC (2112, 2080) Encoder

The Table 74A–2 provides one FEC block (65b block stream) at the output of the FEC (2112,2080) encoder. The corresponding 64b/66b block stream input to the encoder is as described in Table 74A–1. The example shows one FEC block, a stream of 32 65b symbols generated from the output of FEC (2112,2080) encoder with 32bit parity appended at the end of the FEC block. The transmission is from left to right within each row and from top to bottom between rows. The first bit out on the wire starts at the top left hand corner. Note that there is both binary representation and hexadecimal symbol representation in the table, in case of the hex symbol, the most significant bit of the hex symbol is sent first

**Table 74A-2— Transcoded FEC block**

T bit [0]	64 bit payload hex [0:63]	T bit [0]	64 bit payload hex [0:63]	T bit [0]	64 bit payload hex [0:63]	T bit [0]	64 bit payload hex [0:63]
1	40ea1e77eed301ec	0	ad5a3bf86d9acf5c	0	de55cb85df0f7ca0	1	e6ccff8e8212b1c6
0	d63bc6c309000638	1	70e3b0ce30e0497d	1	dc8df31ec3ab4491	1	66fb9139c81cd37b
0	b57477d4f05e3602	1	8cfd495012947a31	0	e7777cf0c6d06280	0	44529cf4b4900528
1	85ce1d27750ad61b	0	456d5c71743f5c69	1	c1bf62e5dc5464b5	0	dc6011be7ea1ed54
1	1cf92c450042a75f	0	cc4b940eaf3140db	1	77bb612a7abf401f	0	c22d341e90545d98
0	ce6daf1f248bbd6d	0	dd22d0b3f9551ed6	0	574686c3f9e93898	0	2e52628f4a1282ce
0	f20c86d71944aab1	0	55133c9333808a2c	1	1aa825d8b817db4d	0	637959989f3021eb
0	976806641b26aae9	0	6a37d4531b7ed5f2	1	53c3e96d3b12fb46	1	528c7eb8481bc969
<b>Parity hex [0:31]</b> d96e7685							

**74A.3 Output of the FEC (2112, 2080) Encoder after scrambling with PN-2112 sequence**

The Table provides the stream of data at the output of the FEC (2112,2080) encoder after the data is scrambled with the PN-2112 sequence as described in 74.8.4.4.1. The corresponding 2112 bit FEC block input to the scrambler is as described in Table 74A-2. The example shows the stream of data in 64 bit format (33 64b symbols) generated from the output of FEC (2112,2080) encoder after the PN-2112 scrambler. The transmission is from left to right within each row and from top to bottom between rows. The first bit out on the wire starts at the top left hand corner. Note that there is hexadecimal symbol representation in the table, in case of the hex symbol, the most significant bit of the hex symbol is sent first

**Table 74A-3 - FEC block scrambled with PN-2112 sequence**

64 bit stream hex [0:63]	64 bit stream hex [0:63]	64 bit stream hex [0:63]	64 bit stream hex [0:63]
5f8af0c4097c3f80	41f8478344eaa348	63528e27118f9895	04ece90da1ced78f
46c800f1757073e1	95225279a7f52be4	4ea26fd80850eb45	3bedac45a78516c5
0b7ea17f812b631b	21c93674289ff4ba	16404c06cdc83411	cd8cd4f29edd54da
d484a87eebc797b3	6c248529e6f8752c	394b3bad23a465d1	c1e37fe35b24cc2e
533d3f3203b7f1cb	18e710719f0e1712	8acccebbe8ab51228	262d29a42e49395f
86cf7d0a403b303f	fab45f84fa7ba8a4	f0984ec15a069e53	76d68d447728b6cd
2fcfce095671475b	430ab84e7e18e76c	be70a9720a41816a	7ac5b6267300487b
0e8997b88d4f3ecc	0a4a271763047600	d1b49afe67393bdb	e7cd3bc22b0d1237
7d030b8774d0fd4d			

**Table 74A-3— FEC block scrambled with PN-2112 sequence**

	64 bit stream hex [0:63]		64 bit stream hex [0:63]		64 bit stream hex [0:63]		64 bit stream hex [0:63]
	5f8af0c4083cd5b6		2b57dbab4e33e17d		b1354680bbe0bac1		4193315242cb81b6
	cc1ba1c9f7b7fe64		90838ec46d969470		a913b019c27f5689		7633f46ec762b6d9
	d1e410905587d0e4		f9b66a42540af04a		9909b64535a725b8		5005107c48b4a6aa
	f9d684ce4396f7a9		1b26e0a025c5d0fd		a4f2c62bc4611217		3638dc7504ea755e
	13fe232e3cdd2a84		5c5118ed10f6ffd8		5077fba23970c87d		52ec1279d355fc57
	48263899cc6652da		f746ec8b31bd6b40		006f5809784c86a7		989b9bd1aab70f0f
	57d99a87b9a9cc74		09ffb2754f318f33		ca8fce7654fb1e57		03a9c3acc87e6cdd
	b2574be1e93fcc9a		26c4fde242df5ca6		c645fd2bf2d3d525		5b25e6d7f9d78153
	bd49683cd87b293a						

**74A.4 Output of the PN-2112 sequence generator**

The Table provides the PN-2112 sequence of length 2112 bits as described in 74.8.4.4.1. The transmission is from left to right within each row and from top to bottom between rows. The first bit out on the wire starts at the top left hand corner. Note that there is hexadecimal symbol representation in the table, in case of the hex symbol, the most significant bit of the hex symbol is sent first

**Table 74A-4— PN-2112 sequence**

	64 bit stream hex [0:63]		64 bit stream hex [0:63]		64 bit stream hex [0:63]		64 bit stream hex [0:63]
	ffffffff555540		0001555555552aa		aaaaaaaa000015555		5ffffeaaaaeaaaaa
	aaaa7ffefffe55		5540000755551555		5eaaabffff80000		55550ffffeaaaa0a
	aabeaaabffffff		f8d55510000e5554		155558aaabfffb4		0001555587ffefaa
	ab5aaabeaad5fff		abfff51554000000		d555455501aaaabf		ff52001515540bff
	feaad52aaffaa5		0ffeabfff5f55414		004115555555872a		baeffe5b00141552
	0dffbeea11eabfe		aaad87ffbaffa4a5		541400a7f5410154		4aeabfff8d58045
	455b54febfeaa7f8		abaaeae00bfeabff		2aad455501ffa540		0152aa0affebf554
	4155555527ffba		fff1aaabea000dea		abbeaae1555407ff		2d00105aab5bffe
	f552a15501155fbf						