

SOURCE: Japan
TITLE : EMULATION OF FAS BY CERTAIN BAS CODES IN DRAFT H.221

1. Introduction

According to the discussion results in the Working Party meeting in November 1987, we have investigated methods to cope with possible emulation of FAS by certain BAS codes. Interchanging some bits of BAS and associated parity before transmission is going to be proposed. Comments by members of the Specialists Group are requested before submitting a contribution to the Working Party XV/1.

2. Three methods compared

The following three methods have been compared;

- a) To discard some code words which may cause emulation,
- b) To alternate parity bits every other submultiframes, and
- c) To change the order of BAS and associated parity bits before transmission.

In method a), several BAS codes out of 256 can not be used. In method b), multiframe synchronization is required for all the terminals, which is not wanted in simplest audio terminals. Furthermore method b) requires a change of specification on 'loss and recovery of frame alignment' because the BAS and Parity have a repetition interval of 4 frames.

We have found that we can avoid emulation of FAS by interchanging the order of some bits in method c) as follows;

BAS bits : between 2nd and 4th, between 5th and 6th
Parity bits: between 1st and 3rd, between 4th and 5th.

3. Proposal

We are going to propose the method c) as described in Attachment 1. In this proposal, we can use all of the 256 possible codes and multiframe synchronization is not necessary for BAS decoding. Attachment 2 lists all of the 256 BAS codes and associated Parity codes together with 16 bits transmitted. One can easily find that there is no emulation of FAS in the transmitted bits.

4. Conclusion

Some hardware experiments based on this proposal are planned so that we can provide information on the task requested at the previous Working Party XV/1 meeting. Comments or suggestions are welcome before submitting a contribution to Working Party.

Revision of §3/Draft Recommendation H.221 (pp.12-13 of TD28-XV/1)

The Bit Allocation Signal (BAS) occupies bits 9-16 of the Service Channel in every frame. An eight bit BAS code ($b_0, b_1, b_2, b_3, b_4, b_5, b_6, b_7$) is accompanied by eight parity bits ($p_0, p_1, p_2, p_3, p_4, p_5, p_6, p_7$) where the (16,8) double error correcting code is applied. This error correcting code is obtained by shortening the (17,9) cyclic code with generator polynomial:

$$g(x) = x^8 + x^7 + x^6 + x^4 + x^2 + x + 1.$$

The parity bits are calculated as coefficients of the remainder polynomial in the following equation:

$$\begin{aligned} & p_0x^7 + p_1x^6 + p_2x^5 + p_3x^4 + p_4x^3 + p_5x^2 + p_6x + p_7 \\ & = \text{RES}_{g(x)}[b_0x^{15} + b_1x^{14} + b_2x^{13} + b_3x^{12} + b_4x^{11} + b_5x^{10} + b_6x^9 + b_7x^8] \end{aligned}$$

where $\text{RES}_{g(x)}[f(x)]$ represents the residue obtained by dividing $f(x)$ by $g(x)$.

The BAS code is allocated in the even numbered frame, while the associated parity bits are allocated in the subsequent odd numbered frame. Each bit of BAS code or the parity is transmitted in the following order to avoid emulation of the frame alignment signal;

Bit position	Even frame	Odd frame
9	b_0	p_2
10	b_3	p_1
11	b_2	p_0
12	b_1	p_4
13	b_5	p_3
14	b_4	p_5
15	b_6	p_6
16	b_7	p_7

The validated value of BAS applies to the next submultiframe. A change in configuration can then occur at submultiframe rate, i.e., every 20 ms. In case of loss of frame or multiframe alignment, the BAS should keep the same value as the previously validated one, until frame and multiframe alignment are recovered.

Annex 2 to Doc. #280

BAS CODE	Service Channel		PARITY
	Even Fr.	Odd Fr.	
	9 10 11 12 13 14 15 16	9 10 11 12 13 14 15 16	
0	00000000	00000000	00000000
1	00000001	00000001	01101111
2	00000010	00000010	11011001
3	00000011	00000011	10101110
4	00000100	00001000	11110010
5	00000101	00001001	10000101
6	00000110	00001010	00110011
7	00000111	00001011	01011100
8	00001000	00000100	10001011
9	00001001	00000101	11100100
10	00001010	00000110	01010010
11	00001011	00000111	00111101
12	00001100	00001100	01100001
13	00001101	00001101	00001110
14	00001110	00001110	10111000
15	00001111	00001111	01101111
16	00010000	01000000	11000110
17	00010001	01000001	10101001
18	00010010	01000010	00011111
19	00010011	01000011	01110000
20	00010100	01001000	00101100
21	00010101	01001001	01000011
22	00010110	01001010	11110101
23	00010111	01001011	10011010
24	00011000	01000100	01001010
25	00011001	01000101	00100010
26	00011010	01000110	10010100
27	00011011	01000111	11111011
28	00011100	01001100	10100111
29	00011101	01001101	11001000
30	00011110	01001110	01111110
31	00011111	01001111	00010001
32	00100000	00100000	01110100
33	00100001	00100001	00011011
34	00100010	00100010	10101010
35	00100011	00100011	11000010
36	00100100	00101000	10011110
37	00100101	00101001	11110001
38	00100110	00101010	01000111
39	00100111	00101011	10010000
40	00101000	00100100	11111111
41	00101001	00100101	10010000
42	00101010	00100110	10000110
43	00101011	00100111	01010001
44	00101100	00101100	00001010
45	00101101	00101101	11011010
46	00101110	00101110	01110100
47	00101111	00101111	10100011
48	00110000	01100000	10101010
49	00110001	01100001	01111101
50	00110010	01100010	11010011
51	00110011	01100011	00000100
52	00110100	01101000	01011000

BAS CODE	Service Channel		PARITY
	Even Fr.	Odd Fr.	
	9 10 11 12 13 14 15 16	9 10 11 12 13 14 15 16	
53	00110101	01101001	00110111
54	00110110	01101010	10000001
55	00110111	01101011	11101110
56	00111000	01100100	00111001
57	00111001	01100101	01010110
58	00111010	01100110	11100000
59	00111011	01100111	10001111
60	00111100	01101100	11010011
61	00111101	01101101	10111100
62	00111110	01101110	00001010
63	00111111	01101111	01100101
64	01000000	00010000	01010111
65	01000001	00010001	00111000
66	01000010	00010010	10001110
67	01000011	00010011	11100001
68	01000100	00011000	10111101
69	01000101	00011001	11010010
70	01000110	00011010	01100100
71	01000111	00011011	00001011
72	01001000	00010100	11011100
73	01001001	00010101	10110011
74	01001010	00010110	00000101
75	01001011	00010111	01101010
76	01001100	00011100	00110110
77	01001101	00011101	01011001
78	01001110	00011110	11101111
79	01001111	00011111	10000000
80	01010000	01010000	10010001
81	01010001	01010001	11111110
82	01010010	01010010	01001000
83	01010011	01010011	00100111
84	01010100	01011000	01111011
85	01010101	01011001	00010100
86	01010110	01011010	10100010
87	01010111	01011011	11001101
88	01011000	01010100	00011010
89	01011001	01010101	01110101
90	01011010	01010110	11000011
91	01011011	01010111	10101100
92	01011100	01011100	11110000
93	01011101	01011101	10011111
94	01011110	01011110	00101001
95	01011111	01011111	01000110
96	01100000	00110000	00100011
97	01100001	00110001	01001100
98	01100010	00110010	11111010
99	01100011	00110011	10010101
100	01100100	00111000	11001001
101	01100101	00111001	10100110
102	01100110	00111010	00010000
103	01100111	00111011	01111111
104	01101000	00110100	10101000
105	01101001	00110101	11000111

		Service Channel		PARITY
		Even Fr.	Odd Fr.	
BAS CODE		9 10 11 12 13 14 15 16	9 10 11 12 13 14 15 16	
106	01101010	00110110	01110001	11001001
107	01101011	00110111	00011110	00011110
108	01101100	00111100	01000010	01000010
109	01101101	00111101	00101101	10010101
110	01101110	00111110	10011011	00111011
111	01101111	00111111	11110100	11101100
112	01110000	01110000	11100101	11100101
113	01110001	01110001	10001010	00110010
114	01110010	01110010	00111100	10011100
115	01110011	01110011	01010011	01001011
116	01110100	01111000	00001111	00010111
117	01110101	01111001	01100000	11000000
118	01110110	01111010	11010110	01101110
119	01110111	01111011	10111001	10111001
120	01111000	01110100	01101110	11010110
121	01111001	01110101	00000001	00000001
122	01111010	01110110	10110111	10101111
123	01111011	01110111	11011000	01111000
124	01111100	01111100	10000100	00100100
125	01111101	01111101	11101011	11110011
126	01111110	01111110	01011101	01011101
127	01111111	01111111	00110010	10001010
128	10000000	10000000	00111110	10011110
129	10000001	10000001	01010001	01001001
130	10000010	10000010	11100111	11100111
131	10000011	10000011	10001000	00110000
132	10000100	10001000	11010100	01101100
133	10000101	10001001	10111011	10111011
134	10000110	10001010	00001101	00010101
135	10000111	10001011	01100010	11000010
136	10001000	10000100	10110101	10101101
137	10001001	10000101	11011010	01111010
138	10001010	10000110	01101100	11010100
139	10001011	10000111	00000011	00000011
140	10001100	10001100	01011111	01011111
141	10001101	10001101	00110000	10001000
142	10001110	10001110	10000110	00100110
143	10001111	10001111	11101001	11110001
144	10010000	11000000	11111000	11111000
145	10010001	11000001	10010111	00101111
146	10010010	11000010	00100001	10000001
147	10010011	11000011	01001110	01010110
148	10010100	11001000	00010010	00001010
149	10010101	11001001	01111101	11011101
150	10010110	11001010	11001011	01110011
151	10010111	11001011	10100100	10100100
152	10011000	11000100	01110011	11001011
153	10011001	11000101	00011100	00011100
154	10011010	11000110	10101010	10110010
155	10011011	11000111	11000101	01100101
156	10011100	11001100	10011001	00111001
157	10011101	11001101	11110110	11101110
158	10011110	11001110	01000000	01000000

		Service Channel		PARITY
		Even Fr.	Odd Fr.	
BAS CODE		9 10 11 12 13 14 15 16	9 10 11 12 13 14 15 16	
159	10011111	11001111	00101111	10010111
160	10100000	10100000	01001010	01010010
161	10100001	10100001	00100101	10000101
162	10100010	10100010	10010011	00101011
163	10100011	10100011	11111100	11111100
164	10100100	10101000	10100000	10100000
165	10100101	10101001	11001111	01110111
166	10100110	10101010	01111001	11011001
167	10100111	10101011	00010110	00001110
168	10101000	10100100	11000001	01100001
169	10101001	10100101	10101110	10110110
170	10101010	10100110	00011000	00011000
171	10101011	10100111	01110111	11001111
172	10101100	10101100	00101011	10010011
173	10101101	10101101	01000100	01000100
174	10101110	10101110	11110010	11101010
175	10101111	10101111	10011101	00111101
176	10110000	11100000	10001100	00110100
177	10110001	11100001	11100011	11100011
178	10110010	11100010	01010101	01001101
179	10110011	11100011	00111010	10011010
180	10110100	11101000	01100110	11000110
181	10110101	11101001	00001001	00010001
182	10110110	11101010	10111111	10111111
183	10110111	11101011	11010000	01101000
184	10111000	11100100	00000111	00000111
185	10111001	11100101	01101000	11010000
186	10111010	11100110	11011110	01111110
187	10111011	11100111	10110001	10101001
188	10111100	11101100	11101101	11110101
189	10111101	11101101	10000010	00100010
190	10111110	11101110	00110100	10001100
191	10111111	11101111	01011011	01011011
192	11000000	10010000	01101001	11010001
193	11000001	10010001	00000110	00000110
194	11000010	10010010	10110000	10101000
195	11000011	10010011	11011111	01111111
196	11000100	10011000	10000011	00100011
197	11000101	10011001	11101100	11110100
198	11000110	10011010	01011010	01011010
199	11000111	10011011	00110101	10001101
200	11001000	10010100	11100010	11100010
201	11001001	10010101	10001101	00110101
202	11001010	10010110	00111011	10011011
203	11001011	10010111	01010100	01001100
204	11001100	10011100	00001000	00010000
205	11001101	10011101	01100111	11000111
206	11001110	10011110	11010001	01101001
207	11001111	10011111	10111110	10111110
208	11010000	11010000	10101111	10110111
209	11010001	11010001	11000000	01100000
210	11010010	11010010	01110110	11001110
211	11010011	11010011	00011001	00011001

Service Channel
Even Fr. Odd Fr.

BAS CODE	PARITY	
	9 10 11 12 13 14 15 16	9 10 11 12 13 14 15 16
212	11010100	11011000 01000101 01000101
213	11010101	11011001 00101010 10010010
214	11010110	11011010 10011100 00111100
215	11010111	11011011 11110011 11101011
216	11011000	11010100 00100100 10000100
217	11011001	11010101 01001011 01010011
218	11011010	11010110 11111101 11111101
219	11011011	11010111 10010010 00101010
220	11011100	11011100 11001110 01110110
221	11011101	11011101 10100001 10100001
222	11011110	11011110 00010111 00001111
223	11011111	11011111 01111000 11011000
224	11100000	10110000 00011101 00011101
225	11100001	10110001 01110010 11001010
226	11100010	10110010 11000100 01100100
227	11100011	10110011 10101011 10110011
228	11100100	10111000 11110111 11101111
229	11100101	10111001 10011000 00111000
230	11100110	10111010 00101110 10010110
231	11100111	10111011 01000001 01000001
232	11101000	10110100 10010110 00101110
233	11101001	10110101 11111001 11111001
234	11101010	10110110 01001111 01010111
235	11101011	10110111 00100000 10000000
236	11101100	10111100 01111100 11011100
237	11101101	10111101 00010011 00001011
238	11101110	10111110 10100101 10100101
239	11101111	10111111 11001010 01110010
240	11110000	11110000 11011011 01111011
241	11110001	11110001 10110100 10101100
242	11110010	11110010 00000010 00000010
243	11110011	11110011 01101101 11010101
244	11110100	11111000 00110001 10001001
245	11110101	11111001 01011110 01011110
246	11110110	11111010 11101000 11110000
247	11110111	11111011 10000111 00100111
248	11111000	11110100 01010000 01001000
249	11111001	11110101 00111111 10011111
250	11111010	11110110 10001001 00110001
251	11111011	11110111 11100110 11100110
252	11111100	11111100 10111010 10111010
253	11111101	11111101 11010101 01101101
254	11111110	11111110 01100011 11000011
255	11111111	11111111 00001100 00010100