[Reference] Algorithm of ADPCM

A. Procedure of ADPCM voice analysis

① AD conversion — The voice is converted into the PCM data of 8bit in each sampling rate.

② 8->16 conversion — 256 obtained PCM data is multiplied, and the data of 16bit; It converts it into Xn.

③ Calculation of dn — This Xn is compared with forecast value ^xn, and the difference; dn is obtained.

④ Decision of ADPCM data

It is "0" that dn is positive as for MSB(L4) of ADPCM data. It makes it to "1" negatively.
Absolute value of difference; |dn| Width of quantization; Remainder 3bit(L3,L2,L1) of ADPCM data is decided from the relation of Δn.
Encoding ADPCM data is as shown in Table 5.1.

Table 5-1: ADPCM data and quantization width change rate(f)

L4		L3	L2	L1	f	Condition (In=|dn|/Δn)
Dn>=0	Dn<0					
0	1	0	0	0	57/64	In <1/4
		0	0	1	57/64	1/4<= In <1/2
		0	1	0	57/64	1/2<= In <3/4
		0	1	1	57/64	3/4<= In <1
		1	0	0	77/64	1<= In <5/4
		1	0	1	102/64	5/4<= In <3/2
		1	1	0	128/64	3/2<= In <7/4
		1	1	1	153/64	7/4<= In

Conversion from the voice data to ADPCM data ends because of the above-mentioned operation.

⑤ Update of forecast value and width of quantization

When ADPCM data is obtained, the forecast value of the next step; ^xn+1
Width of quantization; Δn+1 is renewed.

$\hat{x}_{n+1} = (1-2*L4) * (L3+L2/2+L1/4+1/8) * \Delta n + \hat{x}_n$

$\Delta n+1 = f(L3, L2, L1) * \Delta n$: Δnmin=127, Δnmax=24576

*Initialization: Forecast value ^x1=0
Width of quantization Δ1=127

Hereafter, the voice analysis is done repeating the operation of ①-⑤ every each sampling time.