DTMF decoder

Dual-tone multi-frequency signaling (DTMF) is a telecommunication signaling system using the voice-frequency band over telephone lines between telephone equipment and other communications devices and switching centers.

DTMF was first developed in the Bell System in the United States, and became known under the trademark Touch-Tone for use in push-button telephones supplied to telephone customers, starting in 1963. DTMF signaling is currently used worldwide in modern telephony to dial numbers and configure switchboards. It is the tones that you hear when dialing using a standard touch tone telephone.

A DTMF signal consists of the sum of two simultaneous sinusoids - or tones - with frequencies taken from two mutually exclusive groups. These frequencies were chosen to prevent any harmonics from being incorrectly detected by the receiver at some other

DTMF frequency. Each pair of tones contains one frequency of the low group (697Hz, 770Hz, 852Hz, 941Hz) and one frequency of the high group (1209Hz, 1336Hz, 1477Hz) and represents a unique symbol.

	1209 Hz	1336 Hz	1477 Hz
697 Hz	1	2	3
770 Hz	4	5	6
852 Hz	7	8	9
941 Hz	*	0	#

When you dial a telephone number it generates a signal that consists of a series of short DTMF signals interspersed by silence. The signal received at the switchboard will also contain noise from the telephone line.

Touch Tone Generator

This simulates the 'noisy' signal received by the switchboard when a telephone number composed of a vector of the following digits:

{'1', '2', '3', '4', '5', '6', '7', '8', '9', '*', '0', '#'} is given as an input (e.g. [output] = TouchToneDialler{['1', '2', '*'],20);}. The output has a sampling frequency of 8kHz. Each tone lasts between 0.1 and 0.2 of a second and there is a gap between tones of at least 0.05 of a second. However, there is random jitter in the timing so the actual timing will be unpredictable. The level of noise on the output is given by the signal to noise ratio.