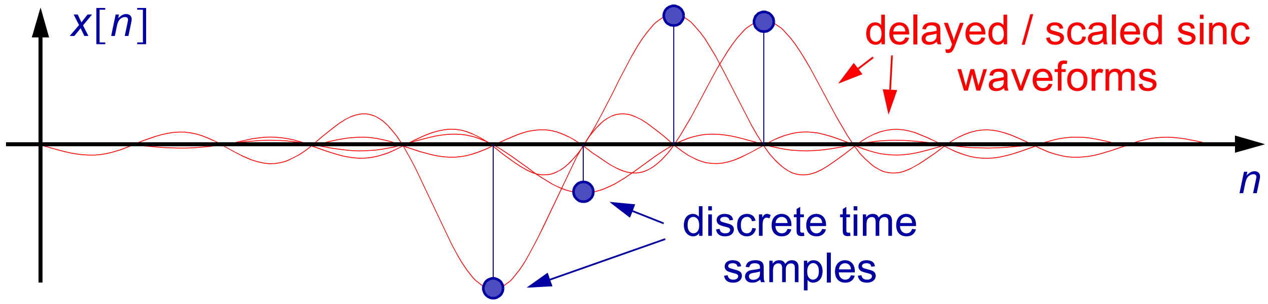
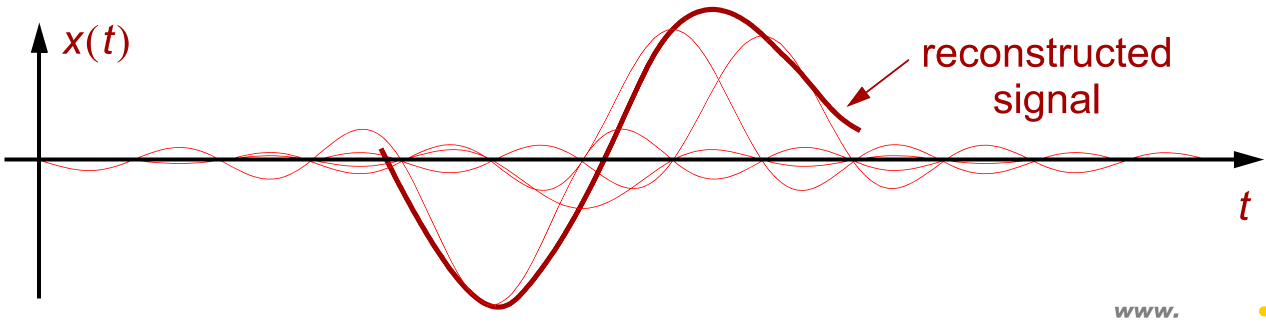
Sinc Reconstruction

- Centre a sinc function on each discrete time sample
- Scale each sinc function by the value of that sample



- **Sum** all of the sinc waveforms together to reconstruct the analog signal



Notes:

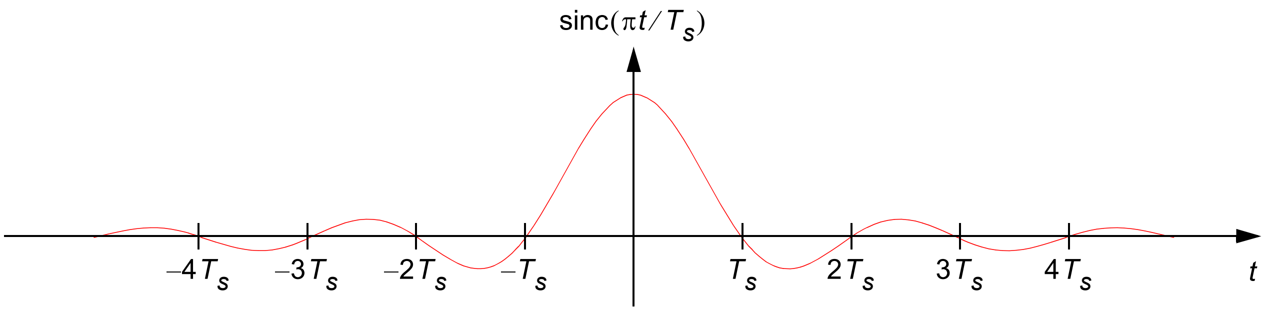
Perfect reconstruction of an analogue signal from a digital signal is performed by summing a series of sinc waveforms, delayed and scaled according to each sample of the digital signal. A sinc waveform is defined as

$$h(t) = \text{sinc}(\pi t / T_s) = \frac{\sin(\pi t / T_s)}{\pi t / T_s}$$

where T_s is the sampling period. If $x[n]$ is a discrete time signal that we with to convert to its corresponding continuous time signal $x(t)$, then

$$x(t) = \sum_{n=-\infty}^{\infty} x[n] h(t - nT_s)$$

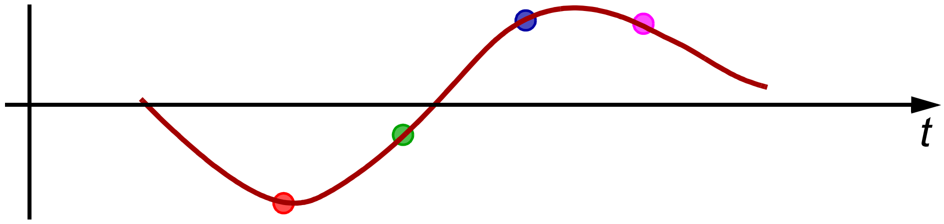
A sinc waveform is shown below.



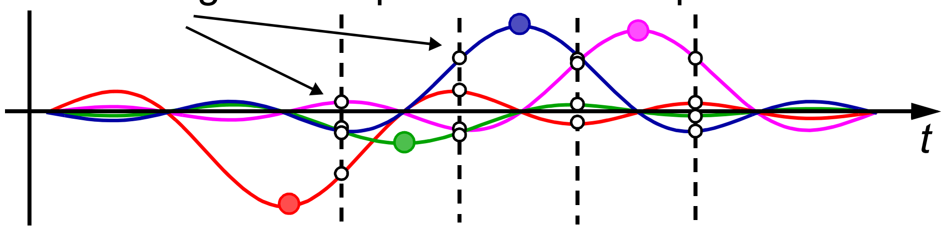
Selective Reconstruction

1.24

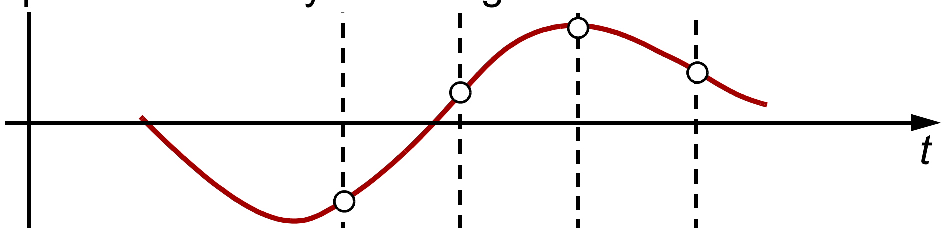
- Original samples ...



- Contributions of original samples to new samples ...



- New samples obtained by summing these contributions ...



Notes:

The previous slide shows that we can avoid having to reconstruct a continuous waveform in order to resample a signal at a different set of sampling points. It shows how the sinc function effectively tells us what the contribution of each existing sample to each new samples is. There is no need to recover the entire continuous time waveform. All that we need are the existing sample values and knowledge of the sinc function.