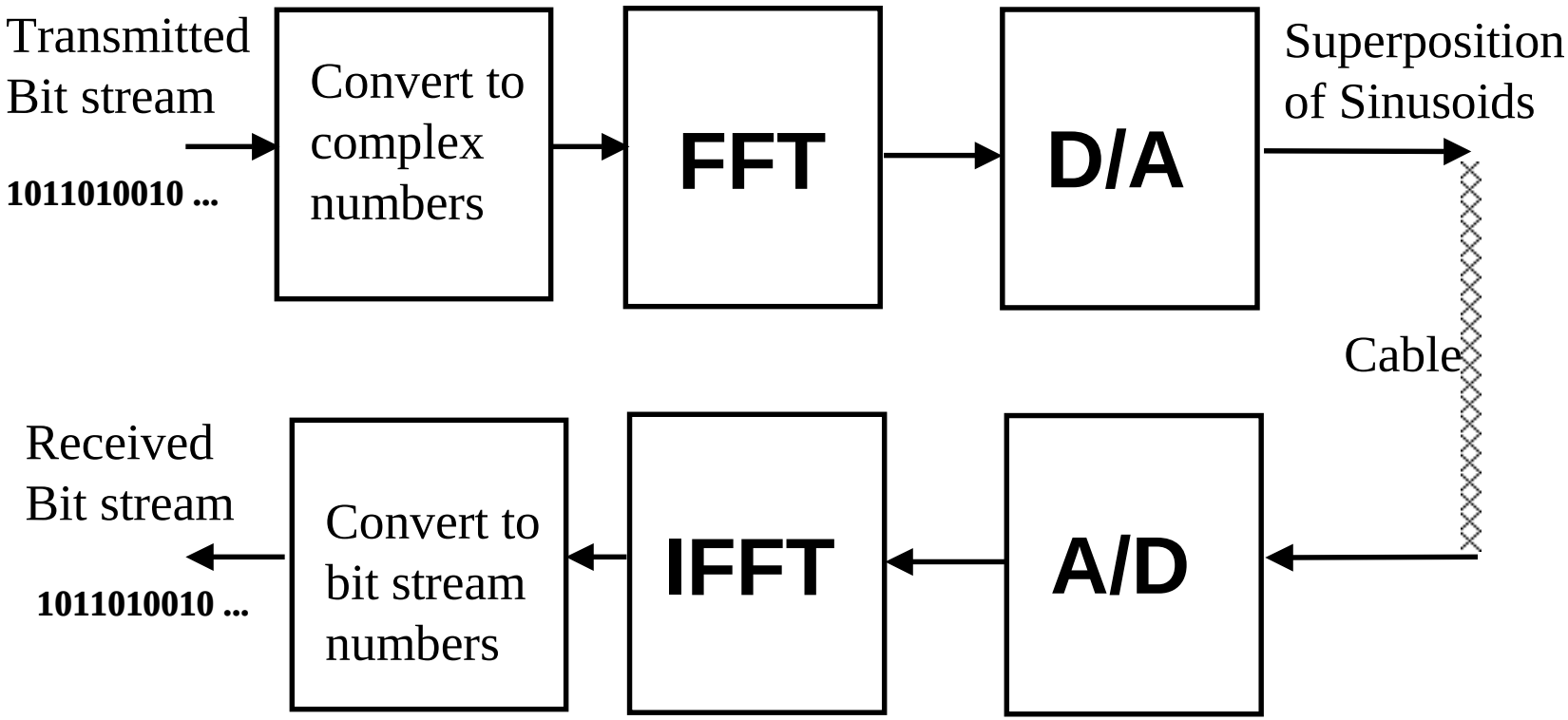
Internet Digital Subscriber Line (DSL) Example

(DSL uses digital signal processing to send Internet data at high rates)



FFT = Fast Fourier Transform
IFFT = Inverse Fast Fourier Transform

D/A = Digital-to-Analog Converter
A/D = Analog-to-Digital Converter

Note that this diagram was simplified for educational purposes.
It omits source coding, channel coding, error correction, and adaptive equalization.
More details will be discussed in EE652.

Sinusoids are very special signals

- **Internet DSL modems use a relatively recent digital modulation method called "Orthogonal Frequency Division Multiplexing" (OFDM) or "Discrete Multitone" (DMT)**
- **Internet DSL modems use the Fast Fourier Transform (FFT) to transmit internet data using superpositions of sinusoids**
- **Sinusoids are the ONLY signals that can pass through linear systems (amplifiers, transmission lines, etc.) without being distorted**
  - **Mathematicians have proved that sinusoids are the only "eigenfunctions" of linear systems**
- **Sinusoids are also useful for image compression**
  - **Images on internet web pages are stored in the JPEG format, which is based on the Fast Discrete Cosine Transform (FDCT)**
  - **JPEG and the FDCT will be discussed in EE 652**