

## Easy



### Split & Transmit

Split each 16-bit ID into two 8-bit blocks.

Transmit these blocks.

### Merge & Save



Merge pairs of 8-bit blocks to get the IDs.

Memorize IDs by  
- storing them in a set,  
- or setting a bit in a BitSet.

## Medium



### Pack & Ship as 8-in-1

Memorize each ID by setting a bit in a BitSet.

This BitSet has size  $16 \cdot N$ .  
Heidi can transmit it 8 bits at a time

### Unpack & Lookup

Reconstruct the BitSet from the received bytes.

Use the BitSet to lookup diligent marmots.



## Hard

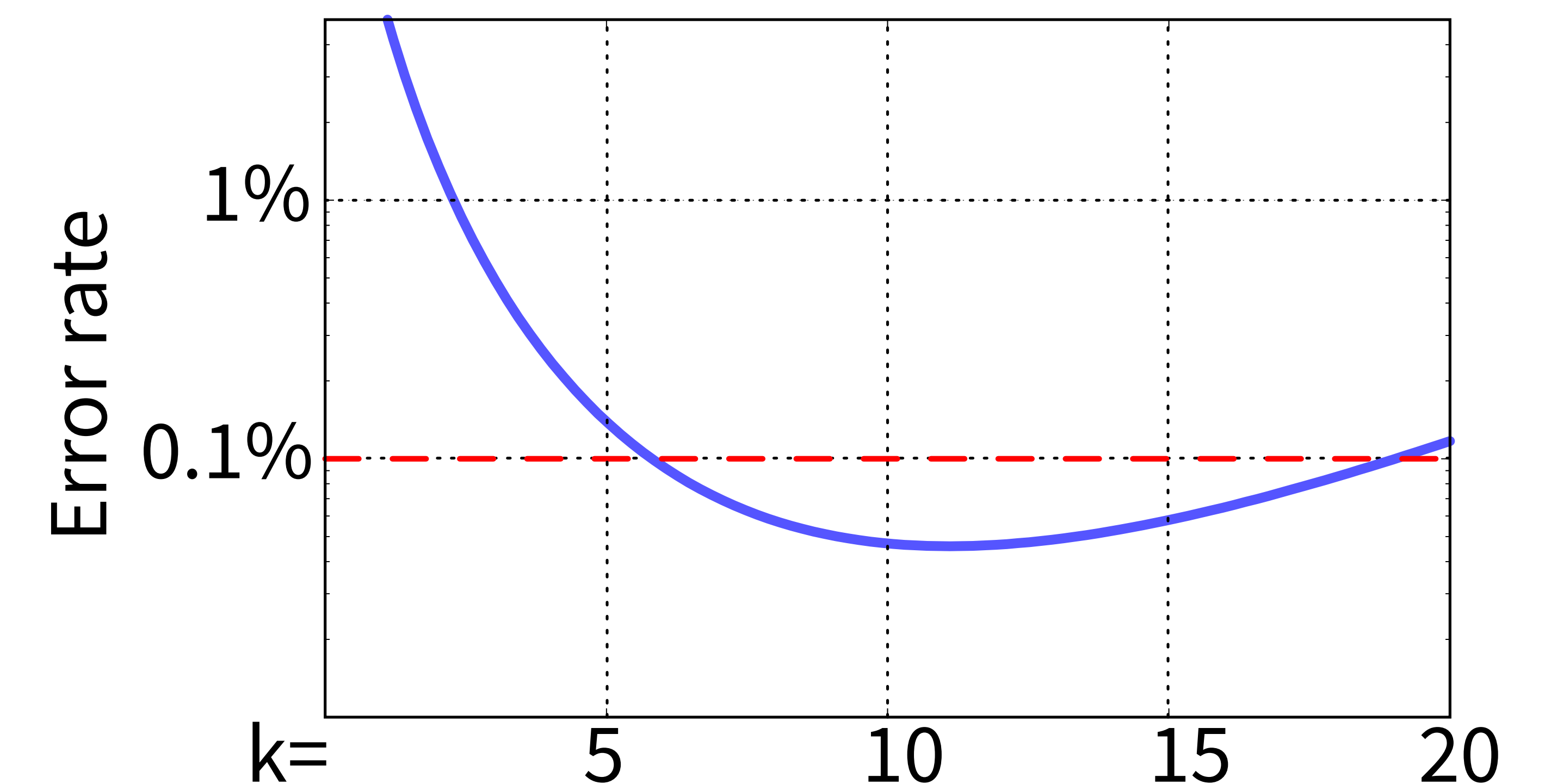
### Hash, Hash & Hash



Map each ID to a hash value  $< 16 \cdot N$ .  
Set the corresponding bit in a BitSet  
Repeat for  $k$  hash functions.  
Transmit BitSet as in Medium.



Reconstruct the BitSet.  
For each ID, use the same  $k$  hash functions as Heidi. Consider a marmot diligent if all bits are set.



More info? Search for "**Bloom Filter**"