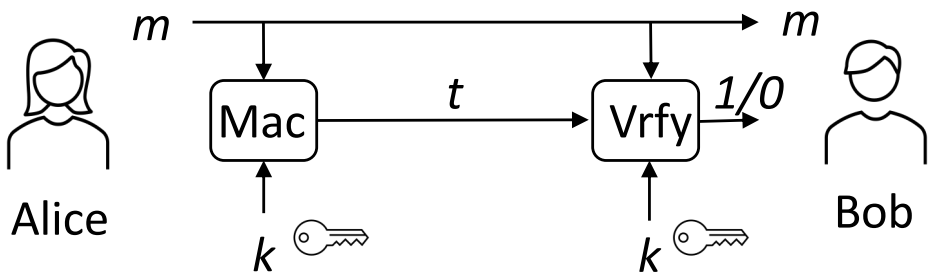
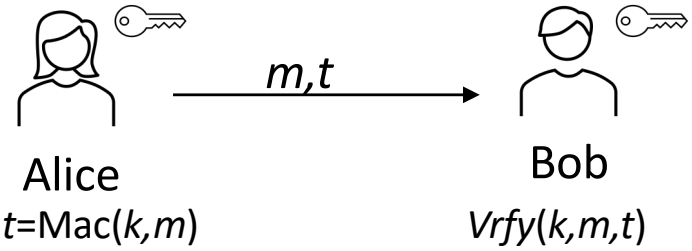
Message Authentication Code (MAC)-

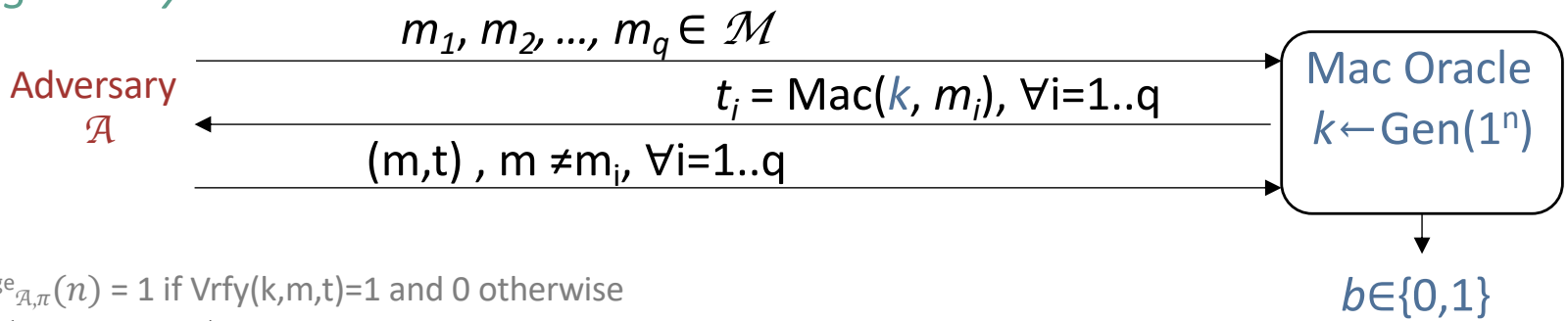


Tag generation: $t = \text{Mac}(k,m)$
Tag verification: $Vrfy(k,m,t) = 1$ for a valid tag, 0 otherwise
Correctness: $\forall m \in \mathcal{M}, k \in \mathcal{K}$ $\text{Vrfy}(k,m,\text{Mac}(k,m)) = 1$



No. of keys	
for N bi-directional communicating parties	
Each: N-1 [k]	*Total: N(N-1)/2 [k]*

Unforgeability



$\text{Mac}^{\text{forge}}_{\mathcal{A},\pi}(n) = 1$ if Vrfy(k,m,t)=1 and 0 otherwise

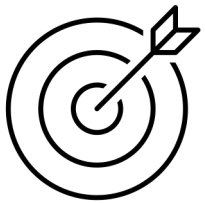
$\pi = (\text{Mac}, \text{Vrfy})$ is existentially unforgeable under an adaptive chosen message attack if $\forall \mathcal{A}$ PPT, $\exists\ \varepsilon(n)$ negligible such that

$$\Pr[\text{Mac}^{\text{forge}}_{\mathcal{A},\pi}(n)=1] \leq \varepsilon(n)$$

** Message Integrity Codes (MIC)*

Terminology

k: symmetric key
m: plaintext
t: tag
Mac: tag generation algorithm
Vrfy: tag verification algorithm



Integrity