

Suppose that someone suggests the following way to confirm that two of you are both in possession of the same secret key. You create a random bit string the length of the key, XOR it with the key, and send the result over the channel. Your partner XORs the incoming block with the key (which is same as your key) and sends it back. You check and if what you receive is your original random string, you have verified that your partner has the same secret key, yet neither of you has ever transmitted the key. Is there a flaw in this scheme?

Answer

Yes, if both of you have the same secret key, the eavesdropper can get the secret key by XORing both results. For example:

Alice picks a random number X and get a result R ($X \oplus K = R$)
Both of the eavesdropper and Bob get R from Alice.

Bob XOR R by secret key K and sent the result X to Alice.
($R \oplus K = X$)
Both of the eavesdropper and Alice get the X from Bob.

The eavesdropper can get the secret key K by XORing R and X .
($R \oplus X = K$)