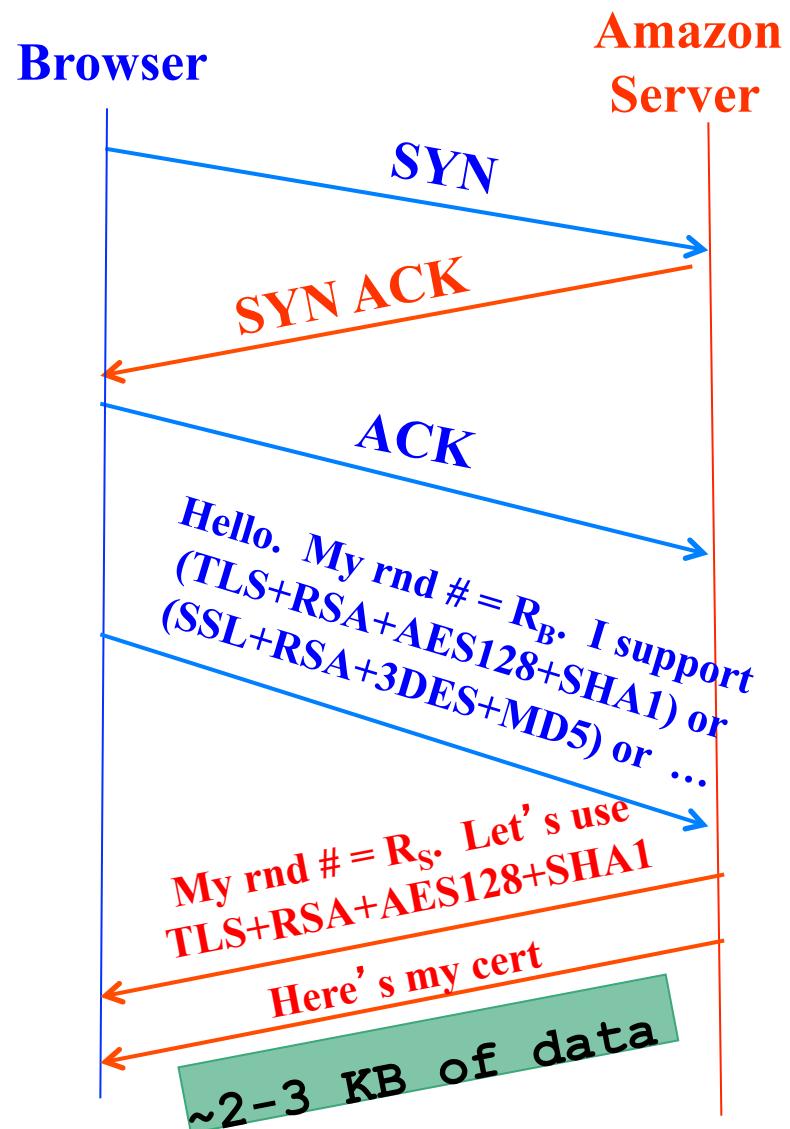


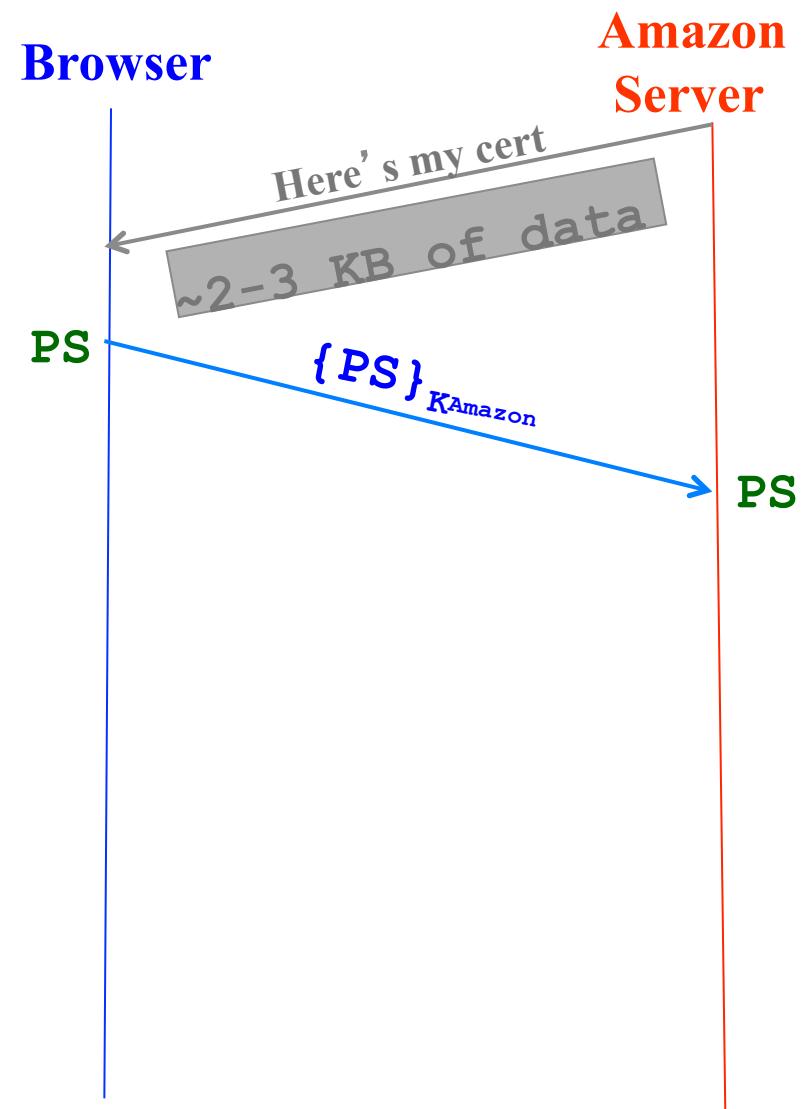
HTTPS Connection (SSL / TLS)

- Browser (client) connects via TCP to Amazon's **HTTPS** server
- Client picks 256-bit random number R_B , sends over list of crypto protocols it supports
- Server picks 256-bit random number R_S , selects protocols to use for this session
- Server sends over its certificate
- (all of this is in the clear)
- ***Client now validates cert***



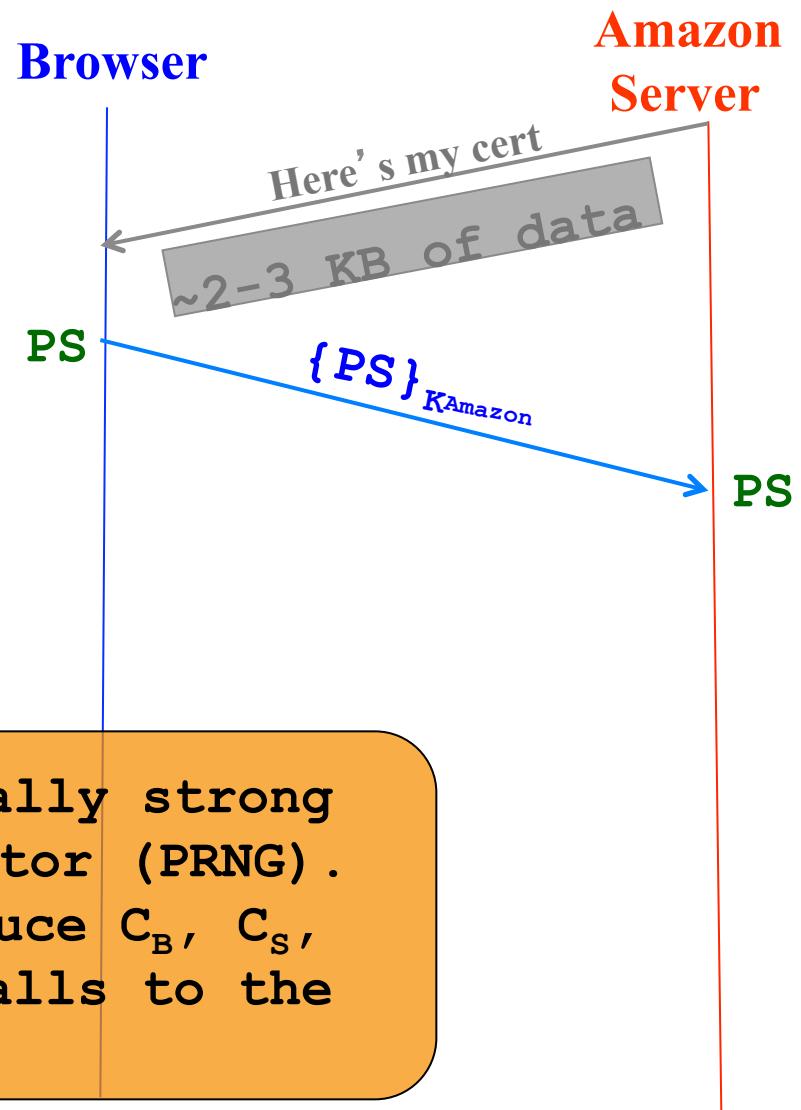
HTTPS Connection (SSL / TLS), con't

- For RSA, browser constructs long (368 bits) “Premaster Secret” **PS**
- Browser sends **PS** encrypted using Amazon’s public RSA key K_{Amazon}
- Using **PS**, R_B , and R_S , browser & server derive symm. *cipher keys* (C_B , C_S) & MAC *integrity keys* (I_B , I_S)
 - One pair to use in each direction



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- Using PS, R_B , and R_S , browser & server derive symm. *cipher keys* (C_B, C_S) & MAC *integrity keys* (I_B, I_S)
 - One pair to use in each direction
- Browser & server exchange MACs computed over entire dialog so far
- If good MAC, Browser displays 
- All subsequent communication encrypted w/ symmetric cipher (e.g., AES128) cipher keys, MACs
 - Messages also numbered to thwart **replay attacks**

