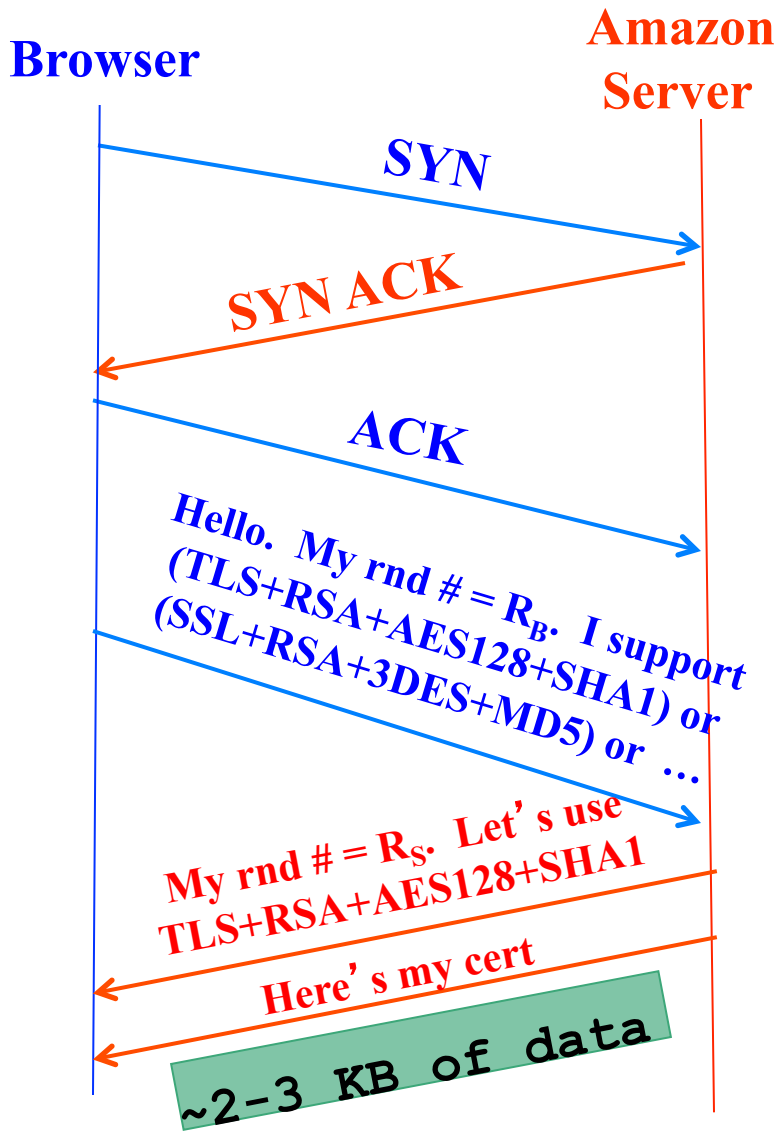
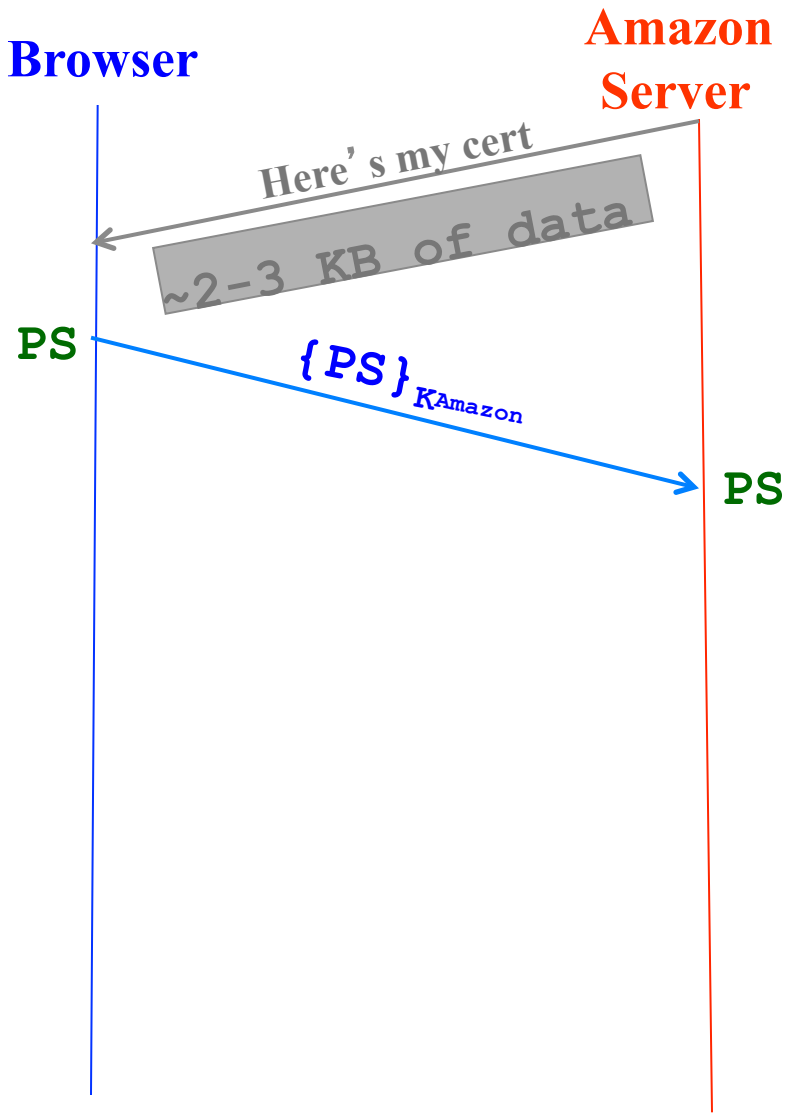
HTTPS Connection (SSL / TLS)

- 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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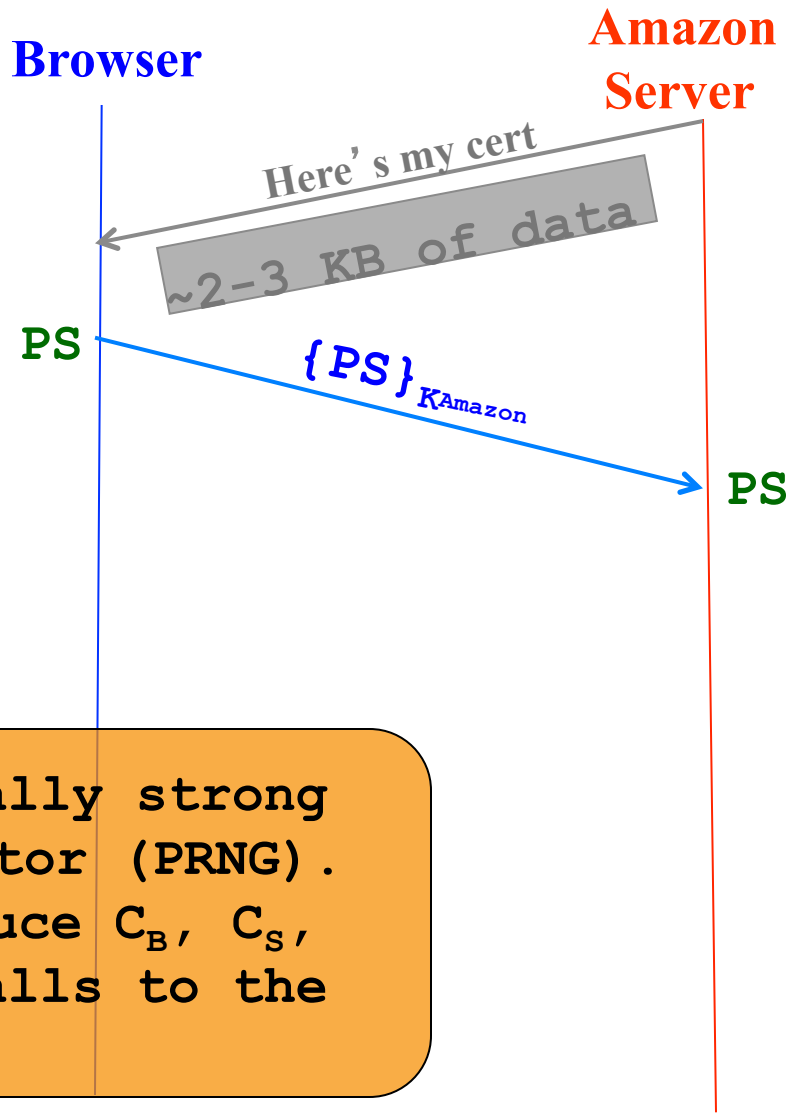

These seed a cryptographically strong pseudo-random number generator (PRNG). Then browser & server produce C_B, C_S, *etc.*, by making repeated calls to the PRNG.

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- 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