

# Advertising Entanglement Capabilities in Quantum Networks



QUANTUM  
INTERNET  
ALLIANCE



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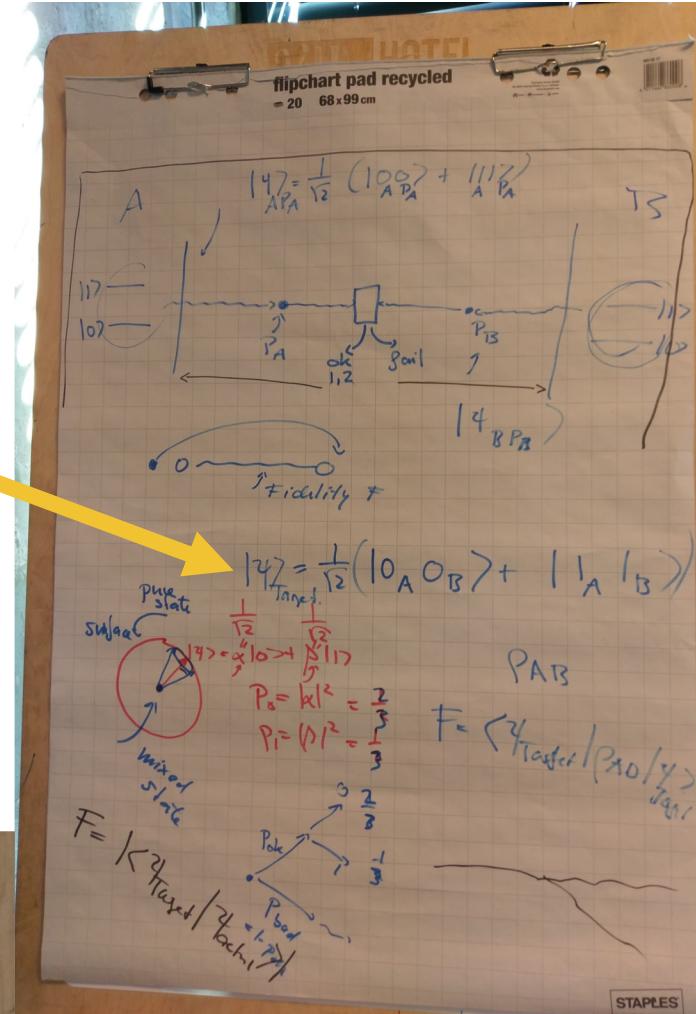
**Quantum Internet Hackathon**  
Oct 14 2018

# What is Quantum Entanglement?

## What is Fidelity?

quality measure Fidelity

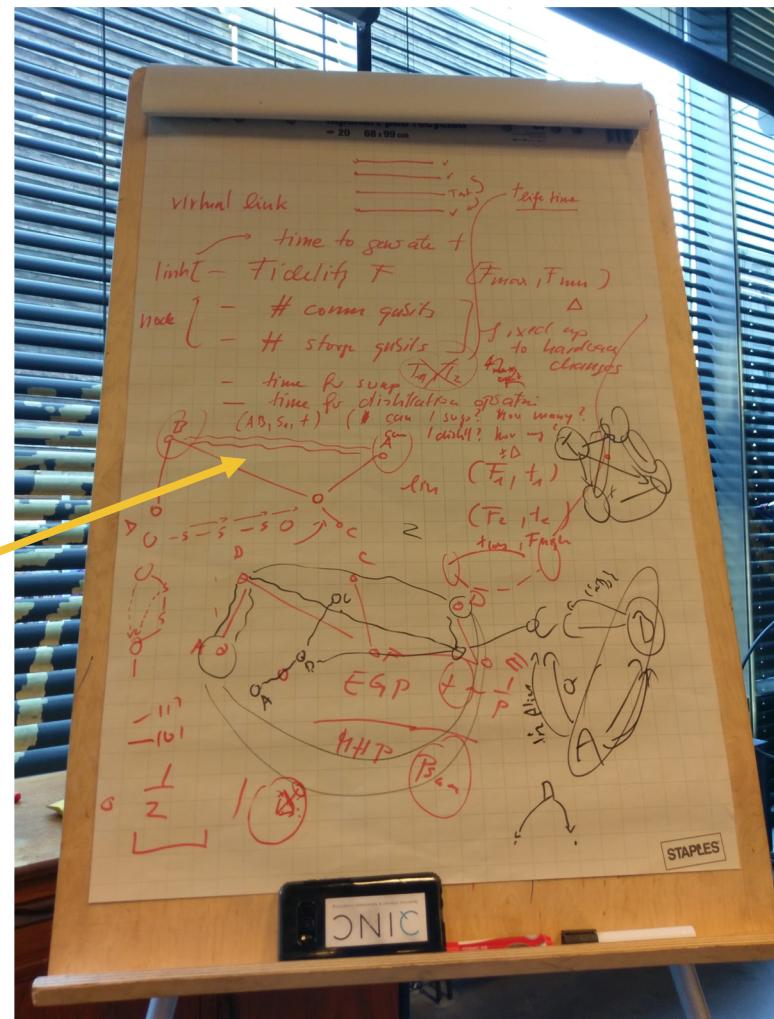
$$F = \langle \psi_{\text{target}} | \cdot P_{AB}^{\text{actual}} | \psi_{\text{target}} \rangle$$



# What is the goal?

- Advertise information across a quantum network to allow a pair of adjacent controlled quantum nodes to create “better” entangled pairs
  - Higher fidelity vs quicker creation
- Give nodes information to allow them to decide whether distillation will improve the quality of entangled qubits
- Allow nodes to choose a path for “multihop” entangled pair (aka MHEP)

Note: the goal here is to provide this information; it is up to an end node to use this to create the EP it needs for the quantum application (e.g., QKD)



What do we need?

New TLVs in  
IS-IS  
OSPF

# What did we learn?

N-V rules!

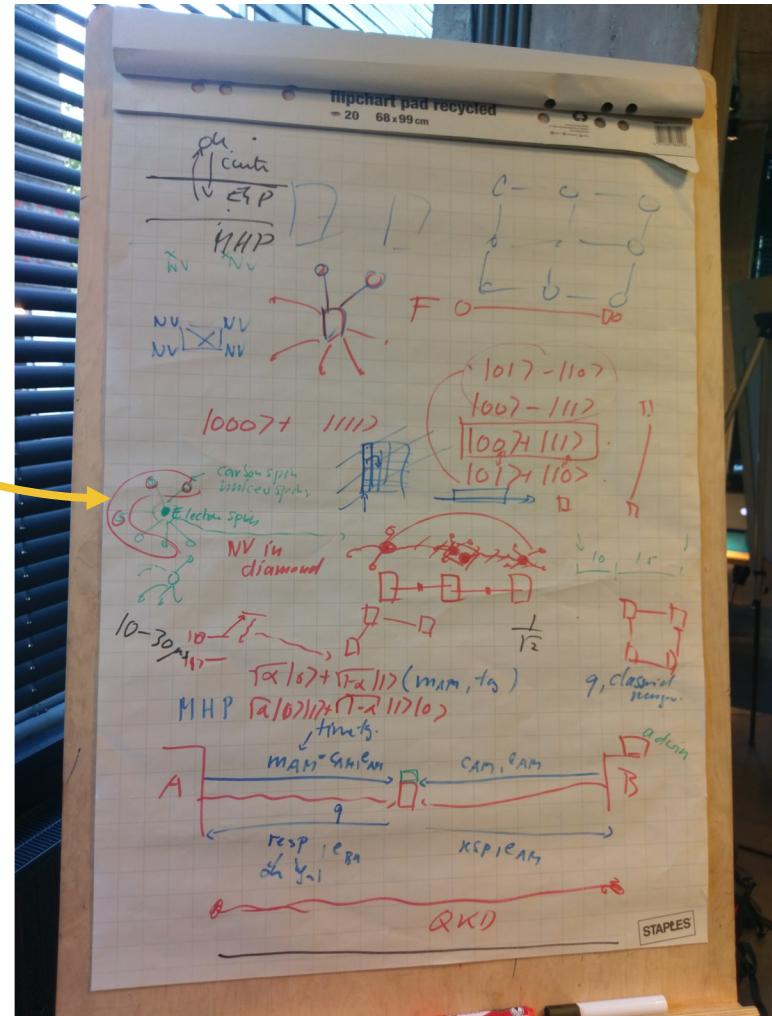
(but we're totally unbiased)

Results, lessons learned

- Learned how to do ASCII art the easy, fun way
- The cat may survive with probability  $\frac{1}{2}$ !

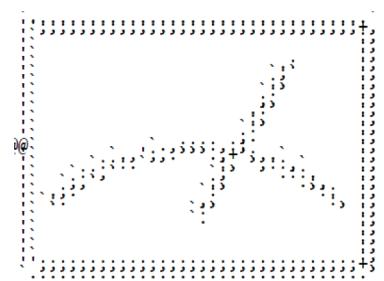
Next steps

- Submit draft to IRTF QIRG by coming weekend
- Write ArXiV note justification
- Start a conversation at QIRG
- Additional drafts needed for protocol details



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After measurement ...



Thank you, Vesna & QUTech

