

# Quantum communication: tasks and resources

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**Abstract.** When classical notions of information and communication are generalized to obey the superposition principle, a grander theory emerges, including phenomena without classical analog such as quantum teleportation, quantum cryptography, and channel superactivation. Unlike classical communications channels, quantum channels have multiple capacities depending on what one is trying to use them for (e.g. classical or quantum communication) and what auxiliary resources (e.g. entanglement or back communication) are brought into play. I review these capacities and the progress in associating them with simple entropic expressions such as Holevo information and quantum mutual information. Among auxiliary resources, sender:receiver entanglement has a strong simplifying role: in its presence all quantum channels become efficiently interconvertible, and their capacity is given by an expression formally identical to Shannon's formula for a classical channel's single capacity.