Quantum internet: the certifiable road ahead[1] DAVID ELKOUSS,
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WEHNER, Delft Univ of Tech — A future quantum internet enables quantum com-
munication between any two points on earth in order to solve problems which are
provably impossible using classical communication. The most well-known applica-
tion of quantum communication is quantum key distribution, which allows two users
to establish an encryption key. However, many other applications are known rang-
ing from protocols for clock synchronization, extending the baselines of telescopes to
exponential savings in communication. Due to recent technological progress, we are
now on the verge of seeing the first small-scale quantum communication networks
being realized. Here, we present a roadmap towards the ultimate form of a quantum
internet. Specifically, we identify stages of development that are distinguished by
an ever increasing amount of functionality. Each stage supports a certain class of
quantum protocols and is interesting in its own right. What's more, we propose a
series of simple tests to certify that an experimental implementation has achieved
a certain stage. Jointly, the stages and the certification tests will allow us to track
and benchmark experimental progress in the years to come.

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