C*-algebras of partial isometries and amenability

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If $G$ is a discrete countable group, then the following are equivalent

- $G$ is amenable
- The action of $G$ on a point is amenable
- Every action of $G$ is amenable
- $C^*(G)$ is nuclear

Here we address the question of how to generalize the above list to when $G$ is replaced by an inverse semigroup $S$. This generalization is motivated by the fact that many C*-algebras are generated by sets of partial isometries closed under adjoint and product, and such a set is necessarily an inverse semigroup. Hence such algebras will be quotients of the universal C*-algebra $C^*(S)$ of some inverse semigroup $S$. We show that the last three points above are equivalent for an inverse semigroup $S$ when “a point” is replaced by “its spectrum,” and propose that these statements furnish a good candidate for the definition of amenability for an inverse semigroup.

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