A calculus for attribute-based communication

The notion of attribute-based communication seems promising to model and analyse systems with huge numbers of interacting components that dynamically adjust and combine their behaviour to achieve specific goals. A basic process calculus, named AbC, is introduced that has as primitive construct exactly attribute-based communication and its impact on the above mentioned kind of systems is considered. An AbC system consists of a set of parallel components each of which is equipped with a set of attributes. Communication takes place in a broadcast fashion and communication links among components are dynamically established by taking into account interdependences determined by predicates over attributes. First, the syntax and the reduction semantics of AbC are presented, then its expressiveness and effectiveness is demonstrated by modelling two scenarios from the realm of TV streaming channels. An example of how well-established process calculi could be encoded into AbC is given by considering the translation into AbC of a proto-typical π-calculus process.

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