Weak multiplier bialgebras

Classically, (weak) Hopf algebras are defined as (weak) bialgebras admitting the further structure of an antipode. In Van Daele (and Wang)'s approach, however, (weak) multiplier Hopf algebras are defined directly without considering the 'antipodeless' situation of (weak) multiplier bialgebra. In this talk we report about a work filling this conceptual gap by finding the suitable notion of (weak) multiplier bialgebra. Our definition is supported by the fact that (assuming some further properties like 'regularity' or 'fullness of the comultiplication'), the most characteristic features of usual, unital, weak bialgebras extend to this generalization:

- There is a bijective correspondence between the weak bialgebra structures and the weak multiplier bialgebra structures on any unital algebra.
- The multiplier algebra of a weak multiplier bialgebra contains two canonical commuting anti-isomorphic firm Frobenius algebras; the so-called base algebras. (Non-weak multiplier bialgebra is defined as the particular case when the base algebra is trivial; that is, it contains only multiples of the unit element.)
- Appropriately defined modules — respectively, comodules — over a weak multiplier bialgebra constitute a monoidal category via the module tensor product over the base algebra. (Based on this fact, Yetter-Drinfeld modules are defined by comparing the monoidal centers of these categories.)

While it is not known if any (not necessarily regular) weak multiplier Hopf algebra (in the sense of Van Daele and Wang's definition) obeys our axioms of weak multiplier bialgebra, we present sufficient and necessary conditions for a weak multiplier bialgebra to be a weak multiplier Hopf algebra.