Summary: The notion of operator-valued frames (OVFs) by Kaftal et al. (Trans Am Math Soc 361(12):6349-6385, 2009) and G-frames by Sun (J Math Anal Appl 322(1):437-452, 2006) do not include all generalizations of notions of frames for Hilbert spaces. For this purpose, we introduce the notion of weak operator-valued frames (weak OVFs) which covers all known generalizations of frames for Hilbert spaces. Theory of weak-OVFs is more demanding than the theory of OVFs due to the following: One, the weak frame operator may not factor and another, weak frame operator may not be positive. As a first step towards a reasonable theory, we impose factorability condition on weak frame operator. We then characterize and derive dilation results. Similarity and orthogonality notions are introduced and characterized. The notion is connected with groups as well as group-like unitary systems. We also derive stability results.

MSC: 42C15 General harmonic expansions, frames 47A13 Several-variable operator theory (spectral, Fredholm, etc.)

Keywords: operator-valued frame; strong-operator topology; topological group; group-like unitary system; stability

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References: