This paper proposes a smart wireless power transmission method, based on a two-step procedure, exploiting real-time beaming of time-modulated arrays. The sideband radiation phenomenon, which is usually a drawback of these radiating systems, is favorably used for intentional wireless power transfer (WPT): in a first step to precisely localize the tag to be powered and in the second one to perform directive WPT. The approach is first theoretically discussed, then the numerical procedure, which integrates full-wave analysis of the antenna array with nonlinear simulation of the modulated nonlinear feeding network, is used to validate the principle of operation and to include nonlinearities and electromagnetic couplings affecting the whole system performance. The procedure allows a flexible design of the time-modulated-array-based WPT system, taking into account the impact of different array elements layout and spacing on localization and power transmission performance. Experiment of the first step is carried out in a real indoor environment at 2.45 GHz: a TI MSP430 drives a Schottky-diode-based network to provide proper modulated RF excitations of the array elements. Measurements show that the system is able to select tags to be energized randomly distributed in a 100 $^{\circ}$-scanning range.