In this study, a novel structure of tri-band branch-line coupler is proposed using stepped-impedance (SIR) resonator to control the frequency ratio between the second and first resonance frequencies of such resonator. The fundamental characteristic of such resonators, the frequency ratio between the second and first resonance frequencies, is targeted as a key factor in arbitrary tuning the resonance frequencies. Based on the first and second spurious resonance harmonic of the SIR, a triple branch-line coupler is designed and simulated. The proposed BLC is shown to demonstrate a tri-band BLC with central frequencies located at 0.9, 2.6 and 4.2 GHz, respectively.

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