

[Ahuja, Mohan; Zhu, Yahui](#)

**An efficient distributed algorithm for finding articulation points, bridges, and biconnected components in asynchronous networks.** (English) [Zbl 0734.68013](#)

Foundations of software technology and theoretical computer science, Proc. 9th Conf., Bangalore/India 1989, Lect. Notes Comput. Sci. 405, 99-108 (1989).

Summary: [For the entire collection see [Zbl 0728.00019](#).]

Let a network be represented as  $G = (V, E)$ , with  $|V| = n$  and  $|E| = m$ . The algorithm uses the distributed depth first search (DDFS) algorithm proposed independently by *I. Cidon* [Yet another distributed depth-first-search algorithm, Inf. Process. Lett. 26(6), 301- 305 (1988)] and *K. Lakshmanan, N. Meenakshi* and *K. Thulasiraman* [A time-optimal message-efficient distributed algorithm for depth first search, Inf. Process. Lett. 25(2), 103-109 (1987)], both improved an earlier DDFS algorithm of *B. Awerbuch* [Inf. Process. Lett. 20, 147-150 (1985; [Zbl 0573.68013](#))] using the same idea. It can detect all the articulation points and bridges, and identify all the members of each biconnected component through one run of a DDFS. The algorithm is efficient in the sense that its time is only  $2n-2$  (which is optimal), number of messages is bounded by  $4m-n$ , each message size is bounded by  $2\log n+2$  bits and there is no complicated local computations. It can operate correctly in asynchronous networks, specially message passing does not need to be in FIFO order.

**MSC:**

- [68M10](#) Network design and communication in computer systems
- [68W15](#) Distributed algorithms
- [68Q25](#) Analysis of algorithms and problem complexity

**Keywords:**

[distributed depth first search](#); [asynchronous networks](#)