In this paper we are interested in mixed-criticality applications, which have functions with different timing requirements, i.e., hard real-time (HRT), soft real-time (SRT) and functions that are not time-critical (NC). The applications are implemented on distributed architectures that use the TTEthernet protocol for communication. TTEthernet supports three traffic classes: Time-Triggered (TT), where frames are transmitted based on static schedule tables; Rate Constrained (RC), for dynamic frames with a guaranteed bandwidth and bounded delays; and Best Effort (BE), for which no timing guarantees are provided. HRT messages have deadlines, whereas for SRT messages we capture the quality-of-service using “utility functions”. Given the network topology, the set of application messages and their routing, we are interested to determine the traffic class of each message, such that all HRT messages are schedulable and the total utility for SRT messages is maximized. For the TT frames we decide their schedule tables, and for the RC frames we decide their bandwidth allocation. We propose a Tabu Search-based metaheuristic to solve this optimization problem. The proposed approach has been evaluated using several benchmarks, including two realistic test cases.