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Dimensioning of IP Networks for Transport of Unicast/Multicast TV Channels

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Supervisor(s): Sabine Wittevrongel, Herwig Bruneel and Danny De Vleeschauwer

Digital TV distribution over IP networks can benefit from carefully choosing which TV channels to unicast and which to multicast, reducing capacity demand by multicasting the most popular channels. We derive an approximative theoretical methodology to study the required capacity and we evaluate this capacity as a function of the underlying channel popularity and user behavior models. In the *static* scenario the multicast/unicast decision is taken upfront. For a bouquet of broadcast (TV) channels and user population, we can determine the boundary between which channels to multicast and for which channels to rely on unicast, such that the required capacity is minimal. In the *dynamic* scenario we consider, every channel is either unicast or multicast depending on its momentary popularity. We theoretically show that the dynamic scenario outperforms the static one and validate theoretical results by simulations. Network operators can use the methodology presented here to estimate the capacity demand.

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Hybrid Optical Switching as an Enabling Technology for Next Generation Service Grids

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Grid computing has steadily been gaining popularity for years, becoming more and more network hungry as applications become more data-intensive. The advantages of Wavelength Division Multiplexing have likewise given optical networking a boost in popularity. Current all-optical networks employ circuit switching as their forwarding paradigm. Burst switching has often been suggested as a possible future optical core switching technology (as well as the technology of choice for grid jobs, using a one-job-one-burst mapping). While circuit switching is better suited for large transfers and steady connections, burst switching excels in forwarding smaller packets. However, neither technology will be able to deliver a solution for the expected demands of next-generation grids, such as increased job diversity, causing both switching paradigms to be less than optimal for a large share of the jobs. We therefore suggest a hybrid solution, combining the advantages of both technologies in order to obtain an efficient bandwidth usage.

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