Toric spaces and face enumeration on simplicial manifolds

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This talk is toward the applications of toric topology in algebraic combinatorics, especially the face enumeration problems for triangulated spheres and further for triangulated manifolds. A motivational problem is the celebrated g-conjecture in the theory of face enumeration. We first review a family of toric spaces associated with simplicial complexes, which can be viewed as a generalization of toric varieties. Then we compute the rational cohomology of these toric spaces for the case where the associated simplicial complex is Cohen-Macaulay or a simplicial manifold. As an application, we can give a topological interpretation for several fundamental results in algebraic combinatorics.