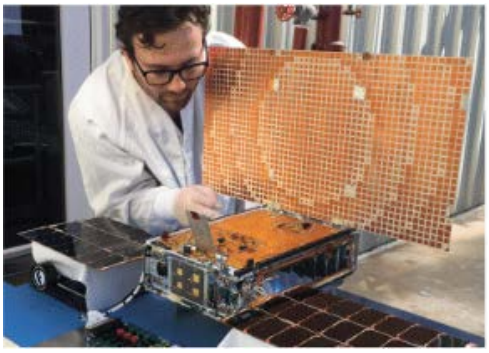
# AT A GLANCE ON THE FUTURE: MODIFYING SATELLITE ANTENNAS ... WITHOUT TOUCHING THEM!

Currently, many communications are done through a satellite on which huge satellite dishes are installed adapted to one type of communication or another (cellular, TV, military ...) and directed to a particular region of the world .

To change the type of communication or the region of coverage, a new satellite must be launched, while the antennas in place are still functional. Another solution would be to use re-adjustable antennas such as a configurable reflector array.

This technology would also be useful on Earth to dynamically track a moving satellite.

MSAT satellite used for cellular communications. Its satellite dishes allow cell signals to converge (focus) on the chosen coverage area.
Credit: Communications Research Center Canada



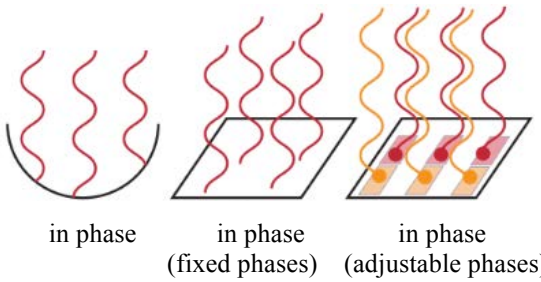
## Practical design!

The reflective grit is flat. It is therefore much easier to manufacture and to transport from Earth to space. It is less bulky and easier to deploy than a conventional satellite dish.

◀ A reflective grit was installed for the first time on the Mars Cube One, a spacecraft which was launched by NASA towards the planet Mars in May 2018. It is flat, but does not yet allow it to be reconfigured. Credit: NASA / JPL-Caltech

A flat shape, however, does not focus the signal the same way as a satellite dish, unless you use a trick.

The antenna surface is cut into many areas, called cells. Each of them reflects the incident rays differently by creating an offset in the waves called "phase shift". The reflected rays are thus modified at the level of the flat surface, producing a beam whose waves oscillate in unison ... as with a parabola!




Representation of waves in phase with a parabola, in fixed phases, with a non-reconfigurable plane surface (static beam) and in phase with a reconfigurable antenna (electronically adjustable dynamic beam).

## Technology for today or tomorrow?

Today, several laboratory demonstration prototypes have been designed and demonstrated. This technology has not yet passed the green light for space, as there are still obstacles to overcome (e.g. temperature sensitivity, power handling, losses, etc.). On the other hand, we are closer to a use for terrestrial terminals, for example to communicate broadband Internet with satellites in low orbit which move very quickly (7 km / second!).