THE
SPACEWARD
FOUNDATION

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Request for Comments – Goals for the 2008 Space Elevator games

Background:
The 2007 Space Elevator games concluded spectacularly this October with an impressive beam-powered climb by the University of Saskatchewan. (see www.spaceward.org for details). The climb demonstrated sub-kWatt power transfer using a conventional IR diode array based beam, to a range just shy of 100 meters.

Figure 1: USST's 2007 IR powered climb

With interest mounting in the Laser and Optics communities, the Spaceward Foundation is considering now a large leap forward in scope, to a balloon-borne 1 km long vertical race track – by far the most significant demonstration of the Space Elevator ever attempted by beam-powered vehicles.

The main driver for this goal is the desire to move into a design region that is applicable to near-term real-world power beaming applications. The competition is supported by NASA's Centennial Challenges program, which is provided this year's prize purse of $2,000,000.

RFC Scope:
This RFC covers the topics of feasibility, rules, safety, and participation. It is not a request for participation, however – team registration for the challenge will open once the rulebook is solidified, which we're targeting for January 10th, 2008. We're looking for comments from any interested parties.

RFC:
The 2008 Space Elevator Power Beaming challenge will require teams to ascend a 1 km vertical tether using beamed power.

For a sense of scale, the image below illustrates what the race track will look like if it were hypothetically held at Meteor Crater in Arizona. The crater is 1.2 km across. The balloon size is exaggerated by a factor of 10, the thickness of the cables by much more than that.

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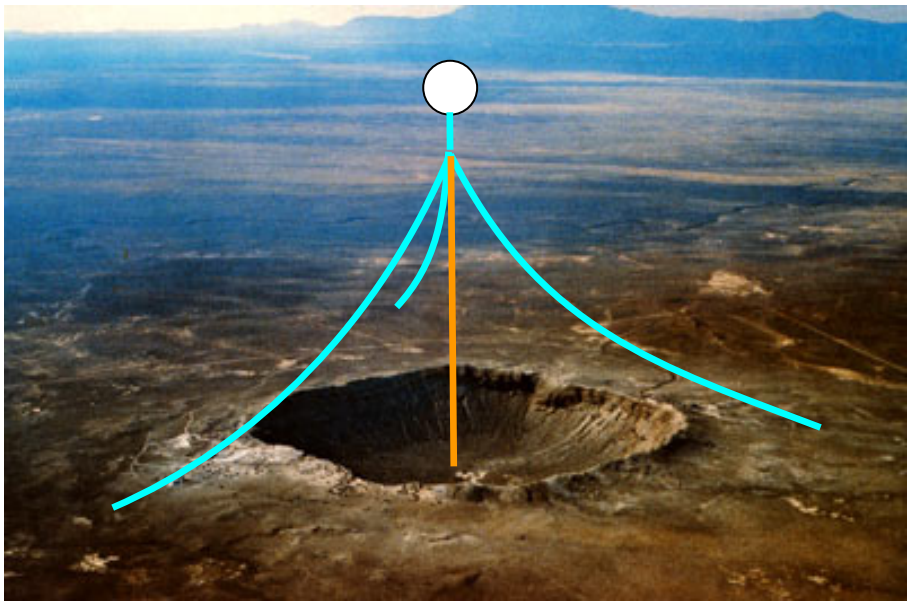

Figure 2: Race track tripod over Meteor Crater (Hypothetical location)

We are currently working on a feasibility study which includes:
- An estimate of the cost of the race-track system.
- A detailed simulation of the structure to evaluate its stability against wind-induced perturbations.
- A survey of the commercial market to assess the ability of teams to acquire use of the components necessary to achieve steady power beaming at a range of 1 km.
- A survey of potential sites to hold the challenge at.
- Discussions with existing and potential teams.
- This RFC.

Our current configuration, to be regarded as a starting point, includes:
- A 4-ton lift balloon, anchored at a height of 1 km AGL using 3 tethers.
- A 3/8" round climb cable, nominally vertical and tensioned at 200 kgf.
- No anti-rotation wire.
- No belay wire.
- 2 m/s minimum climb speed ($900,000 prize purse) and 5 m/s climb speed ($1,100,000 prize purse)
- Climber net weight limit of 50 kg.
- All power beaming sources built into 20' shipping containers. (a la USST 2007)
- All power beaming sources pre-positioned in advance of competition day.
- 1 hour climb "play time" per team

More information and contact:
The complete competition handbook is located at www.spaceward.org/elevator2010-pb.html. Please email comments to rfc@spaceward.org, and please reference RFC-PB2008-1 in the subject line.

Sincerely,

Ben Shelef
CEO, the Spaceward Foundation.