

# **Základní informace o platformě CX2**

## **Předmluva**

CX2, inovativní telekomunikační družicová platforma, určená pro segment trhu s komerčními geostacionárními telekomunikačními družicemi, by se měla stát další telekomunikační platformou Evropské kosmické agentury. CX2 by měl být věnován jeden samostatný element telekomunikačního programu ARTES, do něhož Česká republika zvažuje zapojení.

V odpolední části workshopu v rámci programu “Space Industry Day” představí holandská firma Dutch Space platformu CX2. Následovat budou konzultace účastníků se zástupci Dutch Space, jejichž výsledkem by měly být konkrétní identifikované oblasti zájmu. Tyto podklady budou sloužit jako vstupní informace pro Ministerstvo dopravy ČR a Ministerstvo školství, mládeže a tělovýchovy ČR při rozhodovacím procesu o účasti ČR ve vznikajícím elementu CX2 programu ARTES.

Následující text byl připraven hlavním dodavatelem platformy, společností Dutch Space. Obsahuje základní informace o platformě s identifikovanými příležitostmi pro české subjekty v budoucím elementu.

## **Introduction**

CX2 is very small Geo platform for telecommunication applications by present Geo communication satellite standards. This novel CX2 facility aims at providing competitive solutions to telecommunication satellite operators for the extreme low mass end market segment and is optimized to reach the Geo arc at very low launch costs.

CX2 has a wet mass of typically 1250 kg and targets a market segment well separated and below that of the Small Geo market segment for which a 2500 kg class spacecraft is being developed within the Small Geostationary Programme ARTES11.

The CX2 development programme intends to develop a competitive offering for the commercial and institutional market. The facility will allow reliable missions in the Geo arc at lowest Capex conditions available from Western supply.

## **Market Rationale**

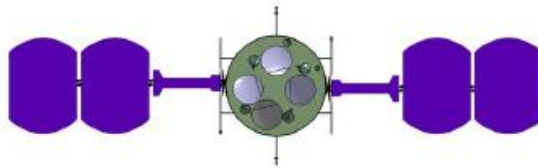
Investment decisions by satellite operators are determined from the business take up perspective of the satellite payload transponders. The result may be either a (very) large, medium, small, or very small Geo communication satellite system.

A larger system with a lower Capex per transponder per year is preferred when a large enough customer base exists or is expected to develop fast enough. On the other hand, a smaller, lower priced solution is preferable if the expected increase of transponder occupancy rate is too slow or would remain too incomplete.

Market analysis reveals that a market niche exists, open to Western supply for the very low end market segment of Geo communication satellites with a payload capacity of < 2 kW with a typical payload of 10 -12 transponders in various bands. Interests in lower capacity systems is based on their specific advantages such as: affordability, niche market services, geographic focus, and autonomy.

In the past 10 years 18 such Geo satellites have been ordered by commercial operators. These operators included SES and Eutelsat in Europe.

A breakthrough in lowering the Capex volume for Geo missions is believed to lead to an increase of the accessible market by tapping into hitherto uneconomical market segments. Realization of such breakthrough in Capex volume is the main objective of the proposed CX2 Geo facility.



### **Platform requirements**

The proposed CX2 facility is optimized to access the Geo arc at uniquely low cost as an additional launcher payload. Therefore, the main differentiating technical requirement is a design that minimizes any effects on the launcher and the launch process.

The CX2 facility is an “opportunity” payload from the perspective of the launch service provider. For the launch provider CX2 is essentially a dead mass that can be stowed under the standard launcher payload adapter when an opportunity occurs for launching the added mass.

The key technical characteristics of CX2 such as its cylindrical shape and its use of electric propulsion follow from this launcher driven requirement. As an example, the electric propulsion enables the spacecraft to achieve its destined Geo arc location irrespective of the specific GTO launcher trajectory.

The main performance characteristics of the platform are:

- Payload mass capacity : 150 kg
- Payload power capacity ; 2 kW
- Lifetime : 15 years
- Spacecraft mass ; 1200-1300 kg (wet)
- Spacecraft power : 4 kW

## **Programmatic aspects**

The design approach is to use existing equipments from existing Astrium communication satellite designs and specifically the Eurostar3000. New developments are foreseen e.g. for the thermal-structural subsystem and specific mechanisms.

CX2 is proposed for development within a new ARTES Programme element consisting of:

- Development of the CX2 platform facility, including the development of key innovative elements and the manufacturing of a Proto-Flight Model.
- Build up of a first mission making use of the proto-flight model equipped with payloads, and including the launch and transfer to the Geo mission location.

## **Schedule**

An indicative BCD planning is as follows:

B phase :	2010
CD phase:	2011-2013
Payload development	2011-2012
Satellite integration	2012-2013
Launch	2013 / 2014

## **Opportunities for Czech industries**

Although most of the foreseen equipments are either existing or adaptations of existing designs, the overall platform assembly represents an entirely new design concept requiring extensive development and qualification testing and novel Ground Support Equipments (GSE) . The main opportunities for Czech industries are identified therefore in this area.

The mechanical ground support equipment for CX2 integration and testing is divided into the following main categories:

1. Integration and handling equipments
2. Transport and Storage containers
3. Test Adapters and fixtures

Ad1) Identified integration and handling equipments include:

- Satellite vertical lifting devices
- Multi purpose interface frame assembly
- Integration dolly and turning trolleys
- Solar array test fixtures and adapters
- Propulsion module integration jig
- Propulsion module lifting device
- Internal Payload module integration jig

- Internal Payload module lifting device
- External Payload module integration jig
- External Payload module lifting device

Ad 2) Identified Transport and Storage containers include:

- Spacecraft container
- Structural module containers
- Payload module containers
- Solar array panel containers

Ad 3) Test Adapters and fixtures include:

- Vibration test adapter
- Thermal test adapter
- Physical properties test adapter
- Quasi-static load test adapter

Additional opportunities are identified in the software and modules for the Electric Ground Support Equipments

