

Insurance Involvement on New Space Activities Development

*Cécile Gaubert**

1. Introduction

This paper will focus on on-orbit servicing missions. These missions have various objectives, as without being exhaustive refueling, repairing, removing, upgrading satellites that have already been launched. They will concern satellites suffering failures, satellites approaching their end of life or satellites needed to be replaced on their orbit or removed to reenter the atmosphere or to be parked on the graveyard orbit. All these missions will be more and more developed and used in the future. This development will obviously have an impact on the space access economics and will concern all space actors including the insurers.

The risks associated to the performance of such on-orbit missions have to be analyzed not only in the light of technical risks (which is not the subject of this paper), but also in light of the legal and insurance risks. Therefore, the first part will focus on the identification of the risks and available insurance (I) and the second part will detail some paths to be explored along with the insurers so that the space insurance market would offer some support in the performance of on-orbit missions (II).

2. Risk and insurance associated to on-orbit missions

We will start with a brief review of the existing insurance covers available as of today along with an overview of the space insurance market status (2.1). In a second part, we intent to establish a none exhaustive list of the risks linked to the satellites on-orbit missions with details on the possible insurance covers (2.2).

2.1 Traditional space insurances and current space insurance market

2.1.1 Traditional space insurances

In this chapter, we will have a very brief overview of the traditional existing insurances for space activities. These insurances respond, with standard conditions, to well-known space risks. i.e. traditional space activities like telecommunication, earth observation etc...

* Gaubert Law Firm.

Space property damage insurance

Such insurance purpose is to indemnify the insured in case of total loss, constructive total loss or partial loss of its satellite (being physical damages including loss of capacity of the satellite) insured under the insurance policy. Usually, this type of cover is subscribed by the satellite operator or manufacturer or owner, as the case may be.

The insured satellite under this insurance is covered in case a total loss, constructive total loss or partial loss occurs. A satellite is declared in total loss when it is destroyed or lost (control of the satellite can't be performed and the satellite can't be used for its intended communication purposes) or it can't reach its dedicated orbit within a certain period of time. In this case, the insurers will indemnify the insured with the full value of the insurance amount, as indicated in the insurance policy.

A satellite shall be deemed a constructive total loss when the loss quantum (difference between the effective and the nominal operational capacity) is above the threshold mentioned in the insurance contract. Traditionally this threshold is agreed between 70% and 90%. In this situation, the insured satellite will be totally indemnified by the insurers, as if it had been totally lost.

A satellite is declared a partial loss when there is partial reduction of the lifetime or operational capacity of the satellite below the threshold used for the determination of the constructive total loss. In this case, the amount of indemnification will correspond to the actual loss of capacity or lifetime sustained by the satellite.

In general, the insured determines the amount of insurance, as there is no legal obligation. This amount represents the maximum amount of coverage, to be mentioned in the insurance policy i.e. the maximum amount to be indemnified by the insurers.

Space liability insurances

As a preamble, we shall note that for traditional third party liability insurances as detailed below, damages are defined as property damage being physical damage, destruction of a property, bodily injury and consequential loss to property damage or bodily injury. It means that financial losses, loss of revenues are covered only to the extent they are resulting from property damage or bodily injury. Therefore, these insurance coverages are usually excluding pure financial loss, loss of use or loss of capacity of a satellite.

Space third party liability insurance

Basically, the insureds are the launch operator for the launch phase and the satellite operator for the in-orbit phase. This insurance is subscribed by the space operator in light of applicable space regulation, if any, in respect of the terms, conditions and insurance amount. The purpose of this insurance is to cover the financial consequences of the liability of the insured in case of damages caused to third party due to a declared and insured space operations.

The period of insurance may vary from a few days to a maximum of one year after launch or after inception of the insurance policy, with possibility for certain insurances to be automatically renewed subject to no loss.

Regarding the amount of insurance, it is defined by applicable law (i.e. UK, French laws...) or by the insured (based on its risk assessment) in the absence of dedicated space regulation or lack of precision from this regulation.

Space products (including services) liability insurance

This cover is typically subscribed by manufacturers, sub-contractors, suppliers and the like. The purpose of this insurance is to cover the financial consequences of the liability of the insured in case of damages caused to third party and due to products (including services) defect after delivery.

Several conditions have to be met in order to trigger this coverage. There must be damages to a third party or contractual party; such damage shall be the result of an accident or incident due to a product default; and the space product shall have been delivered, meaning that it shall not be under care, custody or control of the insured. It is worth at this stage to mention that there is usually no standard insurance cover for professional liability while executing the mission in space. Moreover, the general third party liability insurance market is generally excluding such cover for space risks.

When discussing space insurance, we must also take into account the contractual practices in force in the space environment. Such practices have an impact on the application of the insurance terms and especially on the subrogation rights of the insurers.

2.1.2 Contractual practices

Waiver of subrogation rights by the insurers

As a principle, and under most national laws, further to indemnification of an insured or indemnification of a third party, the insurers have a right of subrogation. As a consequence, the insurers will have the benefit of the rights of recourse of their insured against the entity responsible of the loss. If the insured has waived its rights of recourse, then depending on the applicable law, the insurers may decide not to indemnify the loss or to offer a reduced indemnification due to the absence of right of recourse.

The space insurance policies (property and liability) traditionally include a waiver of subrogation rights from the insurer in favor of the participants to the launch/satellite contractual chain. It means that the insurers contractually agree not to use their right of recourse against the party responsible of the damage to the satellite, after having indemnified the insured for its loss or after having indemnified a third party, except in case of gross negligence or willful misconduct of the responsible party. To be noted that, usually, the insurers agrees to waive their rights of subrogation if the insured has also

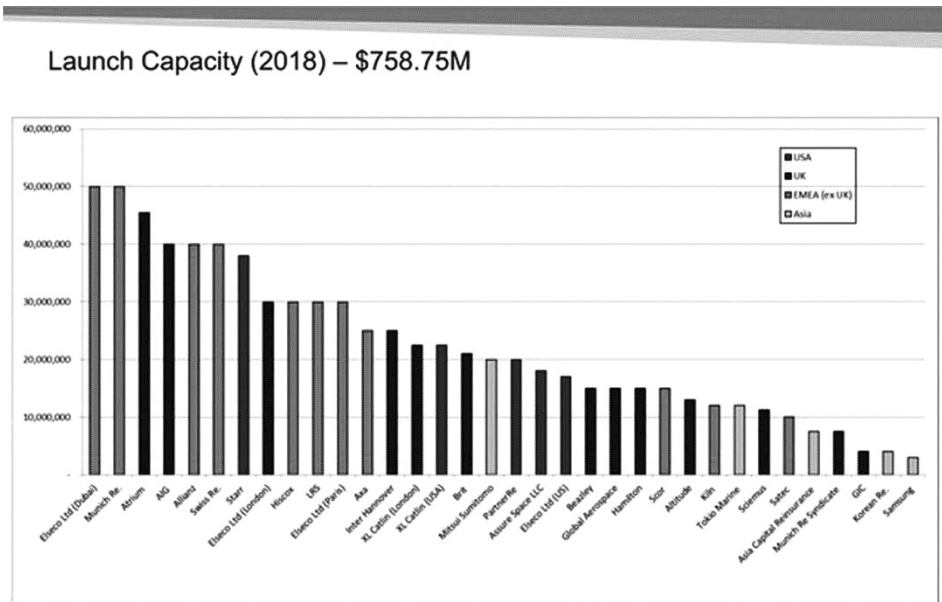
waived its rights of recourse before subscription of the insurance contract. This wide waiver of recourse is the consequence of the contractual practices of “reciprocal no-fault, no-subrogation, inter-party waiver of liability”.

2.1.3 Market capacity

For the time being, we may say that the space insurance market is in over-capacity and have experienced few losses. Therefore, as of today, this market is profitable and allow a high worldwide capacity.

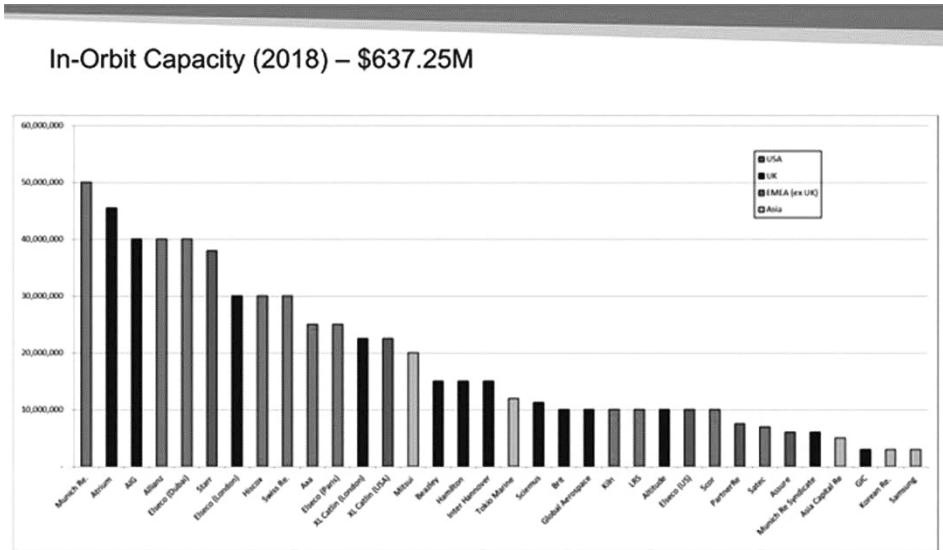
A particularity of the space insurance market is its ability not to respond to natural disaster. However, numerous insurers acting also on space insurance have suffered from the losses caused by the 2017’s hurricanes. It had an indirect impact on the space insurance conditions. We have noticed an evolution in respect of the subscription methods of the insurers leading, for some of them, not to allow any decreased premium for new risks or renewal business in 2018.

Figure 1 Launch Capacity - 2018



However, despite the position of certain insurers not to allow premium reduction, it appears that the space insurance market remains very favourable to the insured and especially to those using well-known technology. The figures 1 and 2 below show the list of insurers present on this insurance segment for launch and in-orbit risks and the overall available capacity for the 2018 year.

Figure 2 In-Orbit Capacity 2018



Source : Marsh SAS capacity survey of Space Insurers

The space insurance capacity being quite high today compared to the real needs of the insureds, we anticipate that some insurers would react favourably to new projects and new insurance schemes. Indeed, it could help them to differentiate from each other's.

Therefore, we believe that there is room for discussion with insurers to develop and implement adapted insurance conditions in respect of new on-orbit projects.

2.2 What risks? What insurance?

In this section, we will focus on the major risks inherent to new projects of on-orbit missions. We don't intent to provide for an exhaustive list, but to highlight some of them.

In addition, we will discuss the applicability of the standard space insurance covers in respect of servicing satellites mission and identify also the situation(s) where no cover is available.

2.2.1 Physical damages to the servicing satellite

The servicing satellite may itself suffer degradation due to the performance of its mission. It is a risk that will be, a priori, beard by the servicing satellite operator.

In order to cover damages occurring to the servicing satellite further to its launch, the space property damage insurance as known can be subscribed by the operator, but to be adapted with respect to terms, conditions, premium rate due to the technical specificities of the servicing satellite and due to its specific mission.

2.2.2 Physical damages to the serviced satellite

Servicing missions implicate that the servicing satellite will have physical contact to the customer's satellite, especially if there is a docking phase. In this event, the servicing satellite may cause physical damages to said satellite. In this hypothesis, we would fall within the scope of the Liability Convention and the launching state of the servicing satellite operator may be held liable and may require its operator to be insured in accordance. Furthermore, it would be relevant to ensure that the launching State of the customer of the on-orbit service will not submit a request for reparation through diplomatic protection. In case of physical damages to its satellite, the customer may wish to be able to claim against the servicing satellite operator for contractual breach of the contract. Therefore, the customer may want to have a right to claim compensation or even refuse to pay totally or partially the contract price, under application of the applicable law to the contract. Such right to claim being subject to demonstration of its loss.

In this respect, the customer may claim damages on the ground of, among others

- compensation of its actual loss (damages to the satellite, costs incurred in repositioning the satellite etc...).
- compensation for its "profit loss" in addition to its actual loss compensation. The validity of the claim will have to be interpreted under the applicable contract law.

The issue is to know whether the standard insurance contracts would respond or not to the specific needs of the customers.

Space property damage insurance

The standard space property damage insurance subscribed by the customer can provide a cover in case of damages, including loss of operational

capability, of the customer's satellite. Being understood that the specific use of a servicing satellite shall be agreed by the insurer and be compensated by an eventual additional premium.

Space liability insurance

The third party liability insurance that would be subscribed by the servicing satellite operator would not respond to damages caused by said satellite to the customer's satellite. The other insurance we could think of is the space product liability insurance, that would have to be subscribed by the servicing satellite manufacturer, in case of damages to the customer's satellite due to a product defect.

2.2.3 Non execution or improper performance of the servicing satellite

We point out here the cases where the servicing satellite cannot perform totally or partially its mission.

In this case, the customer may wish to be able to claim compensation, under the same grounds as detailed in 2.2.3 above, against the servicing satellite operator for contractual breach of the contract. Loss sustained by the customer may be: additional costs incurred and due to the loss, loss of revenue, loss of contracts, loss of the satellite (not placed on the proper orbit or not having its lifetime extended).

As indicated above, the standard space liability insurances including products liability insurance don't offer coverages for non-execution or improper performance during the execution of the mission. Therefore, at this stage, and without having discussions with the space insurance market there is no standard insurance to cover such risks.

2.2.4 Damages caused to third party due to the execution, non-execution of the servicing satellite

We are considering the hypothesis that damage is caused to the space object of a third party (excluding the customer) during the performance of the on-orbit service. The first question is to determine who will be responsible. Under the 1972 convention, if applicable, the launching state relevant to the servicing satellite operator would be liable. However, a victim of a damage caused by the servicing satellite may wish to claim against the satellite operator on the ground of national space regulation or even tort law. Therefore, there are several ground to claim and there is a real judicial risk in this respect.

Space third party liability insurance, subscribed by the servicing satellite operator will cover the financial consequence of the liability of the operator only in case of property damage, bodily injury and consequential loss to third parties. The issue, here will be whether the insurance market is willing to offer such cover at standard terms, conditions and price.

2.2.5 Damages resulting from interferences to third party's satellites

The risk of interference to third-party satellites is particularly important, especially in the area of the geostationary orbit. If it is proved that the servicing satellite causes harmful interference to a third party satellite whose frequencies are listed in the MIFR, the servicing satellite operator shall immediately cease all operations and can be held liable.

Traditionally, the property and liability space insurances are excluding damages caused by interference, except those naturally occurring in the space environment. On an ad hoc basis, the space insurance market has in the past offered dedicated "interference insurance". It will be necessary to revert to the insurance market to know whether the insurers are still offering this type of insurance and at what terms, condition and price.

3. Paths to explore

In this Chapter we will try to find ways for the insurers to support the insureds willing to carry out on-orbit missions or to call upon the services of a servicing satellite. In this respect, we may use existing processes that could be adapted to new projects (3.1) or to develop new concepts (3.2).

3.1 Using known insurance concepts

There are some provisions in standard space insurance wording that could be used, without much adaptation to allow the insurers to provide some support and/or cover with respect to on-orbit missions.

3.1.1 Corrective measures

The first notion to be discussed here is the one of corrective measures. A specific provision relating to these measures is generally drafted as follows in the space property damage insurance contracts:

If a Loss may be satisfactorily corrected or compensated for within a reasonable period of time of the Loss by additional ground installations, procedural changes, software development or any other reasonable corrective measures ("Corrective Measures"), the Insurers, after consultation with the Named Insured, must at their choice either:

pay the Loss Payee in accordance with Insuring Agreement; or indemnify the Named Insured for the costs required to implement the Corrective Measures. If the Corrective Measures do not achieve satisfactory correction of or compensation for the Loss, the Insurers must then proceed with Insuring Agreement in addition to bearing the cost of implementing the Corrective Measures.

The intent of this provision is, in case an insured satellite is declared a total, partial or constructive total loss, the insurers at their choice may decide to either indemnify the damaged satellite as per the scope of coverage or to bear the costs that the insured may have to implement any corrective measures that could compensate totally or partially the loss.

This provision has already been used for some past satellites losses and the insurers are willing to use this terms if they assume that the corrective measures may have a positive impact on the mitigation of the loss.

At this stage, we have to underline that the quoted provision is drafted in a quite wide way. It refers to Corrective Measures as being ground installations, procedural changes, software development or any reasonable corrective measures. We then may assume that the use of a servicing satellite by an insured to save its satellite (for instance refuelling it or correcting its orbit, adding redundancies...), could be understood as corrective measures by the insurers and the insurers could therefore undertake to support the costs of the use of a servicing satellite.

This being said, it has to be heard in mind that the decision to support the costs of corrective measures rely solely on the insurers and not on the insured who will only be consulted on the effectivity of the measures.

3.1.2 Sharing revenues generated by a saved satellite

Some space property insurance contracts include a specific provision relating to the share of the revenues generated by an insured satellite that has been indemnified in total, constructive or even partial loss if such satellite is thereafter still capable of generating revenues. This mechanism is subject to an additional premium comprised within the global final premium. These provisions are not automatic and the insured will choose to subscribe it or not. A common example of salvage clause would read:

‘After a Claim Payment has been made for a Constructive Total Loss or a Total Loss, the Insurers have the sole right to the maximum benefit of salvage including the right to take title to the Satellite.’

This provision, commonly known as “salvage” provision has already been triggered in the past. Typically, the share percentage as agreed in the insurance contracts is comprised between 75 and 90% of the generated revenues. The concept to be debated with the space insurers is to associate them to success of saving an insured satellite by means of using a servicing satellite by perceiving a share of the revenues generated by the saved satellite. Assuming the situation where an insured satellite has lost some capacity, but that said loss could be totally or partially compensated by requesting a servicing satellite to provide fuel or redundancies or other salvage means, then the insurers could after having indemnified the insured be associated to the share of the revenues eventually perceived by the insured in using its

saved satellite. This mechanism would have the advantage to set up in advance the share of revenues to be perceived by the insurers and would avoid any discussion once the case arises.

In this respect, the insurers and the insured would have to agree to a fair share of the revenues, to compensate on one side the insured for the costs of using a servicing satellite and on the other side, the insurers as compensation for the indemnification paid under the property insurance contract. In the author's view the agreed share would have to take into account the costs supported by the insured to operate the saved satellite, along with the costs beard for the use of a servicing satellite and some incentives. On the other side, the insurers should receive a share adapted to the amount indemnified. Obviously, the insurers could receive a share of the revenues without exceeding the total amount of indemnification paid to the insured.

This path could be discussed with the space insurers to support space operators in using servicing satellite to save their damaged satellites, after having been indemnified for their loss.

3.2 Developing new concepts

Aside of using known space insurance concepts to be adapted to on-orbit missions, the insurance market and the insureds may discuss specific provisions or even full programs to offer dedicated insurance options for these developing servicing missions.

3.2.1 Allowing favourable conditions to insurers using servicing satellites

In this section, we're exploring different ways to permit the insurer to support the development of on-orbit missions.

In terms of conditions

Specific conditions may be added in the launch and on-orbit property insurance policies, by which the insurers may agree at renewal of each policy or at the entry into force of the policy and for the whole duration of the policy, not to exclude from the cover any defect elements as long as the insured is using servicing satellites to mitigate the loss. The potential additional premium and specific terms and conditions will have to be discussed with the insurers.

Moreover, the customer using a servicing satellite could subscribe a property damage insurance and include damages to be eventually caused to its satellite by the servicing satellite and have its operator named as additional insured under such insurance, with the benefit of a waiver of recourse against the operator.

In terms of premium rate

In the event an insured can demonstrate that a servicing satellite can be used in its favour if a loss of capacity of an insured satellite occurs, then the insurers of a satellite to be launched or already in-orbit may agree to lower

the premium rate. The insurers may then consider that the insured is acting with due diligence in respect of its insured satellite and therefore would in some way reward him by lowering the premium rate of said insured satellite. This way would encourage the insured to use servicing missions for their insured satellites.

3.2.2 Development of insurance programs dedicated to servicing missions

Another way to explore would be to design specific and full insurance programs comprising property damage, third party liability and even loss of revenues cover in one single policy. This policy would cover the servicing satellite itself, including the damages it could cause to third parties and its customers and also if needed any loss of revenues that could occurred due to the failure of the mission.

Having a single program would ease the subscription of the insurance cover and would allow the insured, being in this case the servicing satellite operator, to benefit from a cover in force for all and any missions of the insured satellite.

Another possible line of approach would be to have the space property insurance subscribed by the servicing satellite operator for example by extending its own property damage insurance to include the customer's satellite for the period during which the servicing satellite is performing its mission. Obviously this scheme will have to be accepted by the insurance market and will eventually lead the insurers to ask for an additional premium relating to this risk addition and to add specific terms and conditions to be applied to this specific mission.

It will be necessary to question the space insurance market in order to identify the conditions that they could offer. In addition, the servicing satellite operator will have to assess the costs of including the customer's satellite (if possible) in its property damage insurance (cost to be reverted to the customer in the mission price) and the cost of the property damage insurance subscribed by the customer.

With respect to this type of insurance cover, there is one major issue that is the assessment of the insured value of the satellite. Indeed, this issue arises in case the servicing satellite mission is performed on a satellite at the end of life or near its end of life. In which case assessing the amount of loss or damage of the satellite can be difficult as this satellite has a value near zero, but this can be assessed through business revenue generated further to the refueling or repositioning of the satellite and based on applicable contracts.

Finally, we would also think of a full insurance program that could be subscribed by both the servicing satellite operator and the operator of the satellite to be serviced. In this case, the risks would be mitigated between both operators and the insurers could eventually lower their exposure.

4. Conclusion

Based on the current status of the space insurance market, there are some coverages available for property damage and liability risks, but they will need to be adapted to the specific servicing on-orbit missions.

Even if the insurers are willing to offer some kind of cover in respect of servicing missions, the insurance won't cover any and all risk or would provide limited cover. It is therefore important to look closely at the contract between the servicing satellite operator and its customer and to assess the most effective contractual liability allocation.

The servicing satellite operators, the customers and the insurers will have to determine altogether what would be the most effective and adapted insurance scheme.