Plenary Session A
Impact of Communications Satellites on Information Infrastructure

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Chaired by: Y. SUZUKI, Communications Research Laboratory, Tokyo, Japan

Moderator: H. Misuno

Panelists:

N.Helm - Deputy Director, Space & Advanced Communications Research Institute - Geoage Washington University, Speaker from NASA

J. Rigley - Vice-President - Communications Research Center Canada

C Allemand - Director for Programs and Industrial Policy - CNES

Y. Furuhama - Exective Director - National Space Development Agency of Japan

P. Bertolucci - Senior Vice President Sales and Marketing and Customer Programs - Arianspace

Mr. Yoshiaki Suzuki from Communication Research Laboratory

It is my great honor to chair this plenary session

The session title is “The impact of Communications Satellites on Information Infrastructure”. Today we have five distinguished speakers. They’re invited in the session to have fifteen minutes presentation. After each presentation I’d like to invite some quick questions and answers, and after all of presentations we’d like to discuss on the title among the speakers and if there is enough time from flour. Before starting the session may I ask all of you one thing: would you please switch off the ring of your mobile phones. Thank you.

Let’s start the session.

The first speaker is professor N. Helm. Professor Helm is the deputy director of the Space & Advanced Communications Research Institute of George Washington University. Prior to GW University he worked nearly 20 years for Comsat and Comsat laboratories. He held the senior technical and management positions including the Director of Marketing of technical Service Division. And at Comsat he was responsible for consolidation of R&D into an operational system and product. He was also active in

Comsat's experiments on NASA's 80S6 and responsible of many of Comsat's experiments on NASA CTS programs. He and myself are working as co-chairmen of Satellite Communication Working Group of JUSAP, which is Japan US cooperative program, which is held annually in Hawaii. And for his activity in the satellite communication field, as you know, he received the AIAA communication honors along with dr. Iida last year. Professor Helm please.

N.Helm - Deputy Director, Space & Advanced Communications Research Institute - Geoage Washington University, Speaker from NASA

Thank you very much for that kind introduction. Ladies and gentleman, members of plenary session, I'm very welcome to be here this morning, to speak to you and come to the spiteful city of Yokohama, which has very nice convention center. It is a little bit difficult to follow my colleague professor Pelton as I also am going to speak on the larger I think pitcher as we call it and I certainly will not go as wide as professor Pelton on the history and civilization and time. I also think that many speakers in our plenary today will talk more specifically about satellite technologies and my research really at the synergy the togetherness of the Internet and satellites and wireless terrestrial wireless communication. And I look a little bit to the future of all of that synergy. If I were to say much of the information on this slide I think you would say that he really must substantiate it but so I take this research from Mr. Drakker who is a well-known futurist. I agree with everything he's saying. Now age will be a key resource. It's board of us, it's in the future, it's not that we're going to move, we're going to travel, but the knowledge that we have in our brains will be able to move much more quickly through satellites to terrestrial communications from our computers, PDAs in every way. This knowledge will be more mobile more carries it will have more problems with things like patterns and copyright. There really will be an information revolution in which the Internet will be a large part of it. We're just in the infancy, very small part of that. E-commerce will transform our economy and I'm going to show a separate slide on each one of these. Corporation will largely vanish I think that will happen more in US and in Japan, nevertheless it will happen a 40 year period from 1980 to 2020 we will see reversal. In 1980 75% of all people employees worked for large corporations 25% worked in small offices or their home offices. From 1980 to 2020 this will totally reverse so that the we will have 75% of all workers work in small offices and small home offices and their knowledge will be more simply will be more and more consultants and only 25% of employees will work in corporations. Education will be essential, education from ages 2 to 82 and there is very strong theory which I believe

and you can measure future wealth of education. And finally on this slide I knew that I like to Mr. Drakker's research, he really feels that elder people will become more dominants in next 20 year, that we shouldn't retire at 65, we should stay active and we should continue to be consultants and our knowledge is very important and people need this knowledge. I'm going to just look very quickly at the internet domain this survey count this is the number of new internet domain names and you can see the rapid growth and the continuation of a very high growth, may not be so high in Japan and US but you know the internet is still growing extremely rapidly jumps of nearly double in the internauts as now 180 million people and it will continue to grow at a very good growth rate. This slide shows an Internet generated revenue this is more than just e-commerce this is all of the revenue from the Internet and as you see each of all jumps are basically doubling. It's been doubling every year and we believe it's going to continue to do so the last year in this area of the terrible down turn. The down turn in the telecommunications and the down turn in satellite communications the bubble has burst in the internet so to speak but we're still nearly doubling the amount of revenue generated by the internet. This internet growth in the first generation we used the text and the data, e-mail we're probably more in second generation now of web network, video streaming information, browsing, but we have in front of us many, many more generations the third, but the third generation would be look, will be more services based. Good computing and the different applications that we'll see just a number of them. Good computing, optical networks, knowledge systems, next generation management software, everything, the systems will become more open source. I think we'll have smaller Microsofts and larger Linux driven open source systems. And we'll have peer-to-peer services, that is to say that you'll be more able to talk and communicate in work with your colleagues wherever your colleague is around the country around the world. You won't have to go through a hub corporation. In the advanced Internet continues I believe doubling every 18 months will continue for decades. People keep saying that cannot do so I believe that it will continue. New technologies, molecular engineering, molecular electronics will continue for decades so we will have that kind of growth of doubling every 18 months. Communications versus transportation professor Pelton covered it in much depth and I have been strongly believer I started research in this area in 1974 when I was sitting gasoline lines waiting to get enough gas to go to my job at Comsat laboratories, which was 45 km away. We certainly in future are not going to commute that far. We are not going to go across town to purchase things. We certainly going to allow communications and e-commerce and we're going to stay at home and allow our networks and our

knowledge to travel for us than we're going to travel ourselves. And again this is a part of this whole e-commerce revolution that we're going to see. Right now e-commerce is about 2% of all commerce. And I believe in the prediction that very quickly in the 10 to 20 years it will be 50 %. Half of all commerce will go electronically. And greater home education. Continuing an advanced internet, the role of governments and I'm not saying that governments are bad, but governments control our societies and unfortunately, the terror situation at least causes my own government to begin to be much more controlling The wireless network, mini cameras, are going to allow much more infringement on our personal liberty on our personal movement. I'm not going to dwell here but we're going to have a PIN or identification number I believe we're all going to have numbers fairly soon. And that number will be your passport your driver's license your number after birth and the number of your death. That number will travel with you everywhere. Every time you go to medical record, every time you cash the credit card every time you make a movement your number will be registered. So that more and more the governments will be able to know where you are all the time. And they're going to tell you that of course will monitor your health so there will many reasons that it will be important for you and eventually it will be implanted under your skin. And your number will be radiating all the time. A role of the big business, I'm not saying that the big business is bad, is very good our major corporations are very good and doing excellent job but the future role of the big corporations, we like the liberty in movements of corporations but now we have a major problem called Spam, unsolicited e-mail it's going very soon to be half of all internet traffic. So we also have to look at the role of technology in all of these future advancements in line of technology. And in line of society. Broadband value there was a studied by Gardner that said any of the developments of the governments; any of development nations will increase their GDP their overall data Their overall revenue by 50 billion if they introduce the broad band to their societies and to the networks. And that day these peculiars studies at broadband should be at least 10 mega bits. So that any develop nation that goes broadband will increase their value by 50 billion dollars.

I believe that high altitude platforms will be part of the future communications, there's an excellent research be done all around the world, including CRL there are four companies now that have hardware whether they be baloons, and manned or unmanned. I think the future will be unmanned and one of the companies are beginning to build them commercially. Satellite and terrestrial wireless synergy that coming together of satellites wireless. I think it's going to happen we have now taken some spectrum away from mobile satellite in the United States spectrum and allowed

the mobile satellites users to be able to transmit terrestrially so that we can penetrate buildings so it's some good news and some bad news. I think for future standards and protocols overall synergy between the wireless and satellite will be good and I think in future we'll going to have future telephone especially for the expensive telephone for the international travelers. In this telephone you will press in your number. And it will initially look for wireless LANs for bi-fire wireless LANs if it finds that it will send your signal through a wireless LAN if it doesn't find a wireless LAN it will look for a cellular tower and it will send you a signal via a cellular tower if it doesn't find that it will look for a high altitude platform and if it doesn't find that it will look for a satellite. All of this will be built in the EU one form. You really won't know or care if the satellite provider will probably charge more than the wireless LAN provider. In every stage you will probably be able to complete your communications which every technology you use. The fiber glut we are all aware that we predicted the Internet would double every six months nine months. People talked about requirements and all of these companies large international companies will comes and others that could ride off the investment. Put it all in this fiber and it perhaps as low as only 3 % of all fibers being used. Predictions go from 3 % to 33%. It's help to consumer but it really has been bad for business and telecom industry in United States as lowest 2 trillion dollars in last three years. And we had a lot of layoffs more than 150 000 and it is certainly a down turn. It's just no way and I certainly believe that we're going to see the growth in 2003 and 2004.

Data mining again I will talk about governments at least our government as here is an example. There was a program at FBI and others to begin to follow all credit cards transactions all medical transactions perhaps not by all people but by select segment of people in United States. And our US senate said no that it really is wrong we're going to eliminate all founding and senate in our country controls most programs. Unfortunately just recently I read that White House of US has taken this program nearly a billion dollar program from the FBI and DARPA and given it to our Central Intelligence Agency and said it does not require any new founding. So there is a billion dollar program that will data mine our credit cards our information in the US it is going to happen it's going to be run by the CIA and it does not need our congressional approval. Spam as business is goes 30 % the prediction is now by July. Spam is when own your computer and all of this image pornography or whatever comes on screen and something that you do not want it's stops you where you are you have to get rid of it and sometimes it makes difficult to get rid of it. That's Spam in July will be 50 % - half of all Internet traffic will be unsolicited we do not want it. It's just slows down our

networks. Unfortunately it became quickly a very large business. Its targets home and targets our families and we need some kind of. And unfortunately the wealthy of us can afford the software to get rid of it and the poor people will have to live with it. Digital divide Japan has much better understanding of the digital divide need, I've been following the work of dr. Utsumi Secretary General of the ITU he's now leading the organization into very good digital divide program. And I really upload that I didn't put on this chart necessarily to make us feel bad. Nevertheless I'm not going to give all of my money to the poor, I think it's part of my job to continue, to educate. And I think we can all find things to do to try medicate this digital divide as you can read if we take all of the world's population and we'll call it 100%, than you can see 57 are Asian, 21 Europe, 14 you can read this, 52% are female, 50% half of the people of the world are male () today, don't get good flood, 70 % are basically unable to read, 50 % - half of all people have never made a phone call. One has a college education and again when you talk about wealth and the creation of wealth it's education and you track that one percent that will require the future wealth. And 6 of us 6% on nearly 60% of all global wealth. That's getting close to my conclusion and I'm saying that you in Japan have done a better job than US, here is an example – Whites and Asians in US have 70% of access to the internet, only 30 % of Afro-Americans Blacks and 32% of the Spanics we have govern the program that started to offset this and unfortunately this corn administration is eliminating and canceling all programs that will in US help the divided people to access the internet.

The wealthy you are the more you use the Internet. Conclusions are networking will expend and as prof. Pelton said it will expend exponentially the internet is still in its infancy, and will have a lot of expansion in e-commerce grows in magnitudes and communications will replace transportation. Thank you very much.

J. Rigley - Vice-President - Communications Research Center Canada

Next speaker:

Mr. Jack Rigley: was appointed vise president of Communications Research Center Canada in 1998. Prior to this he spent 8 years as CRC director of mobile and personal communications. And prior to joining CRC Mr. Rigley on air ground communication system as research engineer with transport Canada. After completing engineer degree at University of New Plant wick on the military scholarship he served 4 years as an officer in the Canadian Forces. He worked in the area of radar and military satellite communication. Mr. Rigley is a member of the professional engineers of Ontario and AIAA. He serves on the board of directors in the Canadian Center on Merlin

Communications.

It's indeed an honor to be here. I wanted to congratulate publicly dr. Iida and his team on the organization of this conference. I was chairing the conference last year, and he's been able to do what I wasn't able to do and that is bringing sunshine to the conference. I hear that Chris Over has already guaranteed sunshine for next conference next year in Monterey. I don't know how these guys do it but I had never any luck in Montreal last year. With this talk I'm not going to be as futuristic as the previous speaker but I will try to draw an example, small example in the country of Canada of what we've been doing to tide together our policy and goals together with some programs that actually address the topic today which is the impact. And more important why the information infrastructure is so important.

First of all, just to refresh your mind about Canada is second large destination, that's a country of only 30 mln. people and its densely populated at southern border north of our neighbor – US, and as you going north, less and less densely populated. And over our history we turn the technology to tide this country together from the Atlantic to the Pacific Ocean and now to the Arctic Ocean. First of all we used railways in very early 1800 and in 1900 we turned to roadways and airways and later terrestrial communications system and finally satellites communication systems using broadcast and microwave towers. And in 21 century we are looking into communication infrastructure to bind the country together and including all citizens and knowledge based economy. One of the things we accomplished in 1999 we connected all 16000 schools in Canada, every one of them was connected to internet. That time most of the schools were in very narrow band connection to the internet, but never less a very heavy to achieve that goal. And as we turn into 21 century our goals include economic and social goals must be pursued hand in hand and this is a policy of the government and most probably foreign countries also because one sees the link between the social and economic benefits of the dance mat and the connection between innovation and inclusion early speakers talked about the digital divide remote enrolled communities and looking back at Canada you may think that our example is extreme but really isn't when you look at the statistics. We have 75% our population has access to broadband connectivity right now, about 100% of the population has access to telephone and almost all are connected to cable or internet at least low speed internet connections. 25% of the communities now have broad band connectivity which is the challenge and that is the concern of the government and the telecommunications companies. 25% of the communities representing 75% of the communities and this is when attention is

going to now and this is why we've set goals for ourselves and implemented policies and programs to help address this issue of connectivity and inclusion for entire population.
So our goal is become more and most connected nations in the world by 2005. By connecting all Canadians I do mean not that house, igloo or wigwam all have broadband connectivity but every community in Canada can have ready access to broad band communications no matter where they live.
Our government policies to address this are all telecommunications act is embedded with the goals to establishing reliable, accessible and affordable telecommunications services flow Canadians. As I mentioned we've been successfully doing this for telephone and to enlarge degree with low speed internet, and the next challenge is broad band internet connections. Other policies are put in place to secure spectrum and Canada with the number of other nations secure Ka band frequencies of an exclusive basis for multimedia satellite communications at the WYRC in 1992 and at the same time Canada secured for Ka band satellites, because 10 years ago we recognized the importance of satellites communications but broad band communications at Ka band was important for the country and was important for us. Coupled with this in the change with the market environment regulations or recommendations laid down by the world trade organization and just recognizing, the country of Canada and our powerful neighbor, Canada over the last few years to an open skies policy. I don't think we have an open skies policy in telecommunications. And with license to over 55 4 and satellites can provide telecommunication services into Canada. And any Canadian can access mobile satellite communications, any of 5 mobile satellite systems. And that's an example of policy that's been implemented not just because of free trade but because we see the advantage of competitive telecommunications market introducing the information infrastructure much more rapidly in Canada by two ways: one – Canadian could get the satellite access ACS Astra, ACS America Com Satellite as well as to a Telesat satellite and it will also allow companies like Telesat to fly satellites which have as you will see a capacity that illuminates both Canada and US and some case South America. So it works two ways. Now the fourth politer is establishing the infrastructure, well in Canada the government is not the operator or provider of the infrastructure. And in all the programs to assist the development of telecommunications in communities we do have other institutes, which can address and further the development of the infrastructure. And one of these the Canadian Space Agency, and the program which is being implemented as we speak as an example of what Canadian Space Agency has done to achieve a number of goals and one of them is actually investing into telecommunications infrastructure. The satellite of which

we're speaking about to just briefly is not a technical presentation but more of a little demonstration of how one can tie our country's goals and policies and its programs together to address issues such is connectivity. The program resulted from goals with Canadian Space Plan, which included assisting companies that remain competitive, on global bases. And secondly addressing the government's goals of connectivity, at least those of the goals, which respect the satellite communications. And one of the first programs that address these goals is the payload flight demonstration program. And it two key elements – one to develop and demonstrate inspace key Canadian technologies, and two – to add to the Canadian telecommunication infrastructure. So as result of competitive bases the program has chosen with technologies from Com Devon Ems. Telesat that is the prime contract on this government point of view you'll see the other aspects of the satellite, and Telesat is the world's most experienced satellite operator having launched the world's first domestic geo-stationery satellite in 1972. And two technology companies in Canada, first of all Comdev providing what's called beam link based on so device technologies, recognized as lee-technology, and this program is giving Comdev a chance to get flight heritage on his very sophisticated switches which improve the capacity and efficiency Anik F2 and payload on the return link. It's working on all 45 beams Ka band beams of two. EMS technologies known more recently because of the DVB RCS expertise in the leading developing net, the Anik F2 program allowed EMS to develop on board processor. This is an experimental payload it's linking two beams –Vancouver beam and Toronto beam again it's based on DVB RCS. So the DVB RCS terminal can either be connected to star network, which case the user is connected to gate way or MeshTech network by using this experimental payload and any terminal in Vancouver beam can talk to other terminal directly through the satellite neither in the Vancouver or the Toronto beam.

The Anik F2 satellite when it is launched in November this year will be the most complex and largest commercial satellite launched that time. It's on the Boeing 702 bus and it is absolutely massive and almost frightening when you see it at Boeing. There's actually three bands covered on this C-band KU and KA. And the KA band consumes about half of the power and weight of the satellite. And even it's on half it's quiet significant capacity. Here you see the 45 beams, Ka band beams generated by Anik F2 the transmit and receive Ka band antennas provided by EMS I should add. The 500 MHz is available at Ka band is reuse six times once for each of these gateways you can see indicated here by the red dots, and these gateways basically fit the twin 5 and 8 beams. And splitting up that 500 MHz that's available for each this gateway. I should add that Telesat as the telesat's satellites is partner in US as well blue, there are some

mentioned of wide blue yesterday at the cloak room. The good news I received is that investor such as Intelsat and Liberty Media wide blue is basically responsible for the beams which fall on the US and US market of this payload and they have found the partnership with Telesat. In Canada the services will be operated will be offered either by Telesat or by service provider agreed to buy Telesat. So it will named.

So it's very brief description of the F2 system and the technologies that have gone into that. Just in summary it forms the unit privet public partnership it's joint founded by the government Canadian Space Agency and by the companies that I have named. And the CRC providing both technical and managerial program, managerial expertise in this program. It very much a team Canada approach we're quiet proud of that because it's not having the resources not having the prime contractor, we do have to find unique ways of providing Mesh Technologies by positioning Canadian companies. And at the same time establishing one of the most advanced telecommunication networks in the world. And I think when this program is completed we shown that we have done that in the number of ways.

The advantages of putting the technology, advanced technology on the commercial satellite rather than on the technology satellite as we've done in the mid 70's with CTS which Neil Helm worked on that's joint Canada-NASA satellite. The advantages of putting advanced technology on commercial satellite is that schedule will drive you, you can't delay the flight because the technology is not quite ready, it's very demanding. And it gives high visibility to the technologies. Once there up there and operating 'cause it is meant to operate for 15 years in very demanding commercial environment. That' a technical side and the social benefit side or the information infrastructure side is that Telesat is getting back to the Canadian government for program such is tele-health and tele-education. Significant amount of capacity represents at about 10% of the satellite's capacity is handed back to the government over the period of 10 years first 10 years of the satellite's life. For government program such as tele-health and tele-education.

So this the part of the privet public partnership that I spoke about. Where public founds going one direction to develop and demonstrate technology what comes back in terms of social benefit is base capacity for tele-health and tele-education programs.

And at the end of the day well go well goes well and launch deployment of operation of the satellite we'll have in Canada and US very sophisticated addition to the information infrastructure allowing broad band connectivity through wealth of Canada and US. For remote areas. And at the end that the Canada allowing have this huge nation and in summarizing very space population I think the statistics in Canada or

France in terms are possibly even Japan in terms of percentile population that will not be reached by terrestrial telecommunication, broad band communications. It's about the same – between 15 and 25 % that's the significant in the amount of the population. We have found that the telecommunication services to these remote enrolled areas to the schools and the hospitals and to the community centers has great deal and benefits to the communities and the citizens and to the local economy even more than one may found in the urban area where the education and health can be taken for granted. So I think about the minority part of population 15 – 25% telecommunications has many times the social benefits than it would in the more urban environment.
So technology's open doors for all Canadians all citizens and technology will bring us one day a global village and benefits that are social and economic.

Question:
You mentioned V band is RQV beacon on that as well?
Answer:
Actually there's been Ka band and V band beacon on the Anik F2. There will be a Ka band beacon. But because the V band beacon wasn't available on time it is slipped and will be installed on Anik F3 and with that beacon those of us, North American use it to do preparation for KuV-band system

Question:
You mentioned that 100% of schools in Canada are connected to the internet, can you comment the role of satellite communication in that connectivity?
Answer:
16000 schools are connected most with the very low band with rate 9,6 to 19,2 kilobit per second. 1300 are connected by satellite and this is like a direct pc type of service. So it's satellite in the four directions to the user and dial up capability in the return direction. But in some communities even the dial up capability in the return direction is not possible. So for 300 schools we have direct pc at Ku band in four directions and we have a narrow band and nal band and dial up capability in the return direction for 300 schools. This is over the m-sat satellite. This capacity is available for the government and that's the way it's being used to basically in the morning to school goes that line with the very expensive L band carrier and uses that for the return direction.

C Allemand - Director for Programs and Industrial Policy - CNES

I'd like to move to the next speaker. The next speaker is Mr. Christopher Allemand. Mr.

Christopher Allemand obtained master in electrical engineering in June 1989 a master in international strategy in October 1996 and MBA in 2001. In 1990 he has started his carrier with PA of the French Ministry of Defense, Project Engineer on Guidance on the navigation, and control of missiles and satellites. In 1997 he joined CNES the French Space Agency and served as program manager in satellite and Navigation System. In directorate in charge of policy planning and early phases of future space programs. And during that period he actively supported the European Commission responsibility for the European Satellite Navigation System - Galileo. And he also conducted the discussion with Russian and Japanese Space Agency in that field and has been representative in the international working group established by AIAA and dedicated for cooperation in the satellite navigation field. From 2002 he resumed his work at CNES as an analyst of satellite communication industry. He was involved in developing international cooperation in that field. Mr. Allemand please.

Thank you Suzuki san.
Ladies and Gentlemen, ohayou gozaimasu – so as you see my Japanese is on progress, I have battles of 50% of the job at least to continue in that field.
So thank you to the organizers of this conference, to have thought that CNES could contribute usefully to this very important discussion today and during the next four days.
When I started to prepare this presentation “The impact of Communications Satellites on Information Infrastructure” I was looking at the last years what happened and the consequences of telecom slow down or melt down, and it’s impact on growth rate of the satellite industry. To speak concretely as worries of satellite operators looking that their overall overawes are flat, is it long term trend or not.
I’m very pleased to be in Japan because I like very much this wonderful country but also that I think that the key question concerning the future of satellite is our satellite will find it’s place in the global infrastructure. Mostly terrestrial infrastructure but with the position for satellite. And the polemist, I’m not probably the best one, to give the right place to satellite in their global mostly terrestrial infrastructure.
And my feeling is that Japan is the right place, right laboratory, to find quickly what could be this long term role for satellite in the overall infrastructure.
If we have to look only in Tokyo, I would say to make it simple and short, that Qualcom, licensed CDMA technology that is the base for many communication and navigation systems, and NTT Docomo is licensing the I-mode business model and service system. And I think there are some good teachings for us in Europe and US.

So I would like to present very quickly where our view in CNES, so the French Space Agency about this positioning in satellite and information infrastructure. I would like to give you few insights about what we are doing to the French Agency both nationally but also as a player of the European Space Community. And finally I would like to rise some question for all of us concerning what is required make the satellite industry more able to find the best possible place in this overall infrastructure.

So I feel a little bit unbalances because I thought that the mood would be a little bit more pessimistic this morning, looking to what happened in last years. And in fact the questions I have gathered is do we have to worry we as players of the satellite community or not in the long term. Do we have to focus on the worries express but many executive of satellites operators and manufacturers in space news every week, or do we have to look in the middle long term and to be quiet optimistic about true potentials of satellite.

Well our position to that as research agency I would like to stress that point. The reason as space agency is advantage. It's not dictated by the constraints of quarterly financial reasons. Our possibility but also I would say our role is to look a little bit further why – because we have to conduct R&D for the middle long and if we let I would say the very fluctuating short term trends of the market to dictate and to change every 6 weeks our R&D probably we lose a lot of our effectiveness and in 2 or 5 years we would be unable to deliver the right solution. But of course we have to listen carefully what the users of satellites and the satellite operators and the satellite manufacturer are telling us.

As I told you and this is my feeling after listening to the presentation this morning when I look at the last 5 years to what we would have say about the potential of satellite abut also the limitation of satellites especially in terms of competitiveness regarding vis-à-vis terrestrial solution – nothing's changed, at least it is our opinion. To which we can say that the potential of satellite to transport and access either for commercial activities in growth regions but also in more mature regions for instance Europe, probably there is drive to find on the institutional side to fight digital divide by investing some public money to deploy national original infrastructure that is needed to solve the digital divide or to provide backup communication system which is natural resister. So on both sides we know where the satellite can play role, we know that

technology as matured or is maturing, we know that even if we work that very well on the technical side it will not be great solution providing 30% or 50% of broad band access, it will be niche market but necessary once and possible once if the public player and terrestrial player leave to the satellite its right place. We saw very great potential for new services for Houston mobility, we see the very success for DARS in the US but we also want to look at what could happen when the growing success and 3G services will provide for satellite additional broadcasting capacity that could be a great way for terrestrial telecom to save some deployment of 3G services.

So there is probably a great potential for categories and system, which mix the location function of services and global communication services.

Concerning the worries that were raised in last two years due the telecom melt down, slow down of the activities of the commercial side especially, but most obstacles appeared in last two years. Many of them are exogenous to the satellite industry our world has not changed, as the technologies are not suddenly shown some limits that were not effective. There is no revolution now. But there is world where growth is lower so the potential of satellite in the world like Asia is concretizing in the less dramatic words like expected. But the potential is for instance a big obstacle to the development worst over the investment to terrestrial networks. And I just took this example of source global crossing assets, that have been recently purchased because the company was in bankruptcy purchased by Hong Kong or in Singapore operators I think. And so these companies have been able to acquire 22 bln US dollars of assets. So grow network fiber optics mostly. For size of amount 1 mln US dollars. I think there are many valuable people in this room that would be able to do some very good satellite business, if for 500 mln dollars they were given opportunity to buy for 22 bln US dollars of satellite, ground terminals, and maybe to support some subsidiaries to increase subscription rate in the early phase. So yes, it was not mistake to give too much money to terrestrial network but of course there is a consequence to us – now it's almost for free. But what can we do?

Secondly well of course in the short term leading operators are focused on financial driven consolidation. It means that from our point of view they are not in freedom to play their role in terms of development and deployment of new solutions mainly in broadband or access area. We understand their concerns we want to help but due to this general financial environment there are some consequences of them create some difficulties and slows down this process of having the solutions maturity.

We can look at the other example I think, last year the activity was Eco Star merged with Uxe electronics. And we saw the impact it added – on the freezing literally of

broad band investment in US. And this is clearly demonstrated when you look at what is happening to them I will go to that in few seconds. Of course we all depend on overall economic conditions and this is very important why – because we know that satellite comes before the terrestrial network when there is a need for telecommunications and it is where the growth is very important in Asia. And so where the growth is slowing it is a huge problem very much amplified for satellite activities.

We want to be optimistic with very encouraging moves recently. We have to look on with white blue repulsion, with move by ACS Americom to invest in the US with Americom@home, with Eco Star and its CEO investing huge amount of money in broad band few weeks after explain for months that t has no potential. And it is good news, I7m not at all making bad comments of that, and of course a great success of SIRIUS and XM. But what is very much important also for satellites it is what is happening in Asia. Because in Asia the satellite has all the attractiveness I mean to offer optimized solution not solution deployed in the Europe, US ten years ago and adapted to Asia to find new segments for growth but really new systems optimized for the region needs IP Star, NSS 6 in Asia so big projects founded by quiet small player. And we can see that when players in the sector are forced to invest – they do it, they want to take risk maybe the bigger one is more comfortable. And of course new advanced series I have already expressed interest to add what is happening in Japan and especially in potential of many services in research for QZS in this country.

Of course privet player have equal role to play but we think that there is a role for public action. At the policy level. Because when we speak about fighting digital divide at all in Europe, Us or in Japan or more globally to help Africa's region to get access to internet – of course it is mainly public drive and mostly public money will help to reach that goal. Regulate of the actions even in Europe could be important. And at the R&D level I think that nobody to there is thinking that satellite manufacturer or satellite operator alone are able to deploy quickly to be competitive with terrestrial solution so able to cover all the cost of R&D, new terminals and new payload technology.

So very quick look what we are doing in that field. So the contact is that recently European manufacturers have grabbed the significant share of the world market – from 25 to 50% depending on the area. But we in France have the specific interest for this sector, and so there is a huge interest at the French Space Agency - so CNES to help the development in that direction.

So our priorities to there are to help complementing the satellite bus product range available in Europe. Because maybe as Mr. Pelton showed on the slide earlier, we are convinced that mid and long term trend will require new advanced services new advanced payload we don't see clearly, what we can feel is this advanced payload especially regarding mobility applications could require some very big bus and satellites. So we are pursuing this development to European industry.
Also of course, developing new technology is for future payload. Yes of course we are very much conscious that the reason of short term need to help develop terminals to reach economies of scale in manufacturing, terminals for access and that could help probably to lease some transponders for internet access. Yes, but we are space agency too, and I think that everybody is convinced that a new step in technology is required in satellite technology for it to stay competitive and to become still more competitive when compare to terrestrial solutions. So we want to invest in that and there is no part in Europe with the alpha sight satellite to fly in 2006 or 2008 to demonstrate such advanced payload and new services.

Of course as I just told the development of system architecture terminals is also very important for us.

I just wanted to recall that recently we concluded 5 years technology development that was new technology, satellite technology both at the payload and bus level. Most of these technologies have been validated on the goal in 85 or 90% unfortunately we lost satellite last year. But most of the technology developed is already useful in some satellites.

So finally to conclude there are probably many things to do to assure that satellite will play its right role in the future in the infrastructure. I would like to focus on one point – that is not related to helping one kind of application but is more structure. What is a little bit worrying is that due to overall ambiance I the world and very strange budget constraints in Europe or in Japan if we see overall R&D in Telecom's that is already very slow and compare to R&D that is invested in other fields, terms to decrese and key question is what to do such constrains and decreasing budget, what to do to allow in f3 or 5 years the necessary technology will be there. It is a problem. I'm quiet new in this environment I don't have long term perspectives that previous speakers added but it seems to me that increase in international cooperation could be a solution. You know

I'm still amazed at industry structure the same way as 20 years ago and our R&D programs are structured also that way. I mean Europe is making R&D on its side, Japan is investing R&D on its side, US is making R&D on its side, and so on. It makes a lot of non-required costs that are reproduced everywhere in the world. Is it the right approach to, is it the best way to reach our most important goal is not deploy technology for technology but to make sure that technology is available in time for global telecom architects to integrate this satellite technology in their networks. We have to be on time and with decreasing budget I'm a little bit skeptical and speaking a lot with colleagues in Europe and in Japan I think there is probably a strong potential for new approach for cooperation to share non-required cost in development of this technology and use it jointly to deploy this new infrastructure required in Japan, in Asia, in Europe and elsewhere to make it successful business.
So this is the question I'd like to raise and share with you.
Thank you very much for your attention.

(No question)

Y. Furuhama - Exective Director - National Space Development Agency of Japan

Next speaker is dr. Yoji Furuhama. Dr. Furuhama got dr. grade of engineering electronics from Kyoto University, Japan in 1971. He joined post and telecommunication as researcher to radio-meteorology section, radio research laboratory in 1971. He has been the director general of communication research laboratory, Ministry of post and communication. Since 1999 he is executive director of satellite technology research and application. National Space Development Agency of Japan. And Dr. Furuhama's main field of study are microwave remote sensing, Earth-space radio wave propagation, and limiter wave utilization and optical space communications. And he was chair of commission F that is way propagation, remote sensing of the international union of radio science IURS. From 1999 to 2002.
Dr. Furuhama please

Thank you Mr. Chairman for your kind introduction.
Good morning ladies and gentlemen. It is my great pleasure to be here with you and to be allowed to speak on this plenary session. I'd like to take this opportunity to introduce a space program called I-space. And to introduce one of its main project: Winds. This is partially introduced by dr Taniguchi this morning.

I-space is an innovated program leading to future telecommunication and broadcasting and navigation. And I space is a comprehensive concept, consisting of 3 kinds of experimental satellites: test satellite type 8, Wideband Inter-networking engineering test and Demonstration Satellite Winds, the quasi-zenith satellite system QZSS. 8 is for mobile communication, Winds is for fixed communications and QZSS is for mobile communication and navigation.

Major objective of I-space is to develop satellite communication technology and to combine geo-technologies with invading IT or satellite based internet advanced mobile communication and navigation. We expect I-space will open a new vista of the future communication applications such as bridge over digital divide, telemedicine, positioning etc.
Today I'd like to mention that watching I-space will bring about mainly focusing on Winds.
This picture shows the appearance of Winds to be launched in fiscal year 2005. the Wind is being developed in order to construct the international fixed wireless network are going to e-Japan priority policy program. At the beginning of 2001.
Winds is being jointly developed by NASDA and CRL in order to demonstrate applicability of satellite based internet servicing.
The main characteristics of the Winds are: firstly it is Ka band satellite with onboard ATM switch to realize the efficient connection between receiving and transmitting spat beams. Secondly: high speed transmission capability with satellite switching on TDMA up to giga bps. Thirdly: high speed access of 155 Mbps with relatively small antenna of 25cm in diameter. Fourthly: the satellite we have active phased array antenna, which high speed scanning capability and have mat point amplifiers which enable us to combine all output of satellite amplifiers. And then distribute its power among the transmitting spot beams as we like. The Winds position is the main project of the I-space.

This is simplified block diagram of winds but I'm afraid to get into details so I'd like to skip.

Beam coverage of Winds is classified into 2 categories. One the fixed multi beam antenna to realize high data rate communications in Japan in that large circle and major cities in the Asia-Pacific shown by the circle. Multi beam antenna we have high

EILP and 0T performance. For high data rate communications such as 155 Mbps. Second: Active Phased Array Antenna APAA. APAA have electronically scanned beams direction which can be controlled plus minus 8 degrees of the globe.

APAA has got two spot beams for transmitting and receiving. Direction of beams can be controlled at the 2 milliseconds by onboard CPU. The main beam is allowed to 10 microseconds. The combination of APAA and TDMA will realize high flexible capacity assignment in accordance with distribution and changes. Besides active phased array antenna has another advantage of the mechanical controlled antenna in that MPA does not induce any attitude of disturbances to the spacecraft during the positioning operations.

The primary purpose of the Winds satellite is to demonstrate the applicability of satellite internet services to terrestrial communication, such is high speed distribution to mirror sites, the enforcement of internet background and security. High speed internet access from raw area and efficient data distribution.

The Winds satellite is capable to provide 5Gbps IP connection and mesh network configuration for 45 Usat through out the Asia pacific region.
Why carrying hold the I-space program?
NASDA is also conducting a parallel experiments to find out and demonstrate the new applications for I-space.

We demonstrated nearly 20 experiments so far.

I'd like to introduce one of them, which was carried out in our Cross-cooperation Communication Research Laboratory in Asia Disaster Reduction Center.

The experiment's aim at building a disaster information database. The extensive usage of satellite wide coverage let for precise evaluation of damage area its validity caused by natural disaster. In this picture a wide range of damage area was conducted around the coast line by beams of onboard camera on the aircraft. Then collected data and pictures were sent to data processing center via communication satellite to archive into their database. And those were processed by the appropriate software to create a continuous mapping of the disaster area. The image discontinued was stored in the web server. Then relevant government organization can access it on real time basis via

internet.

Next movie is pilot experiment of a disaster management.

This information is sent to ground station by satellite.
Pictures are taken periodically, and they are installed on servers and processed after the flight. We called out the necessary pictures from data archive.
Here is a list of position and we select it like this.

I'd like to show the advantage to the satellite which is to connect the damaged areas as soon as possible..

I'd like to summarize a key point of I-space program, which is our space program.
The main objective of the I-space program is to contribute the save and reliable society in Asia pacific region by extensive use of space infrastructure via satellite.
We have the three experimental satellites like Winds, 8 and QZSS. I believe that the technology is developed through our development space program we contribute to the establishment of future space born infrastructure in the field of information, communication and positioning.

I assure you that through development of geo-space technology NASDA will make contribution to establish save and reliable society in near future.
Thank you very much.

(no questions)

P. Bertolucci - Senior Vice President Sales and Marketing and Customer Programs - Arianspace

Next speaker is Mr. Philip Bertolucci.
He joined the AS in 1992 as a head of business development of South East Asia and Middle East in marketing and sales division. And in 1998 he was named vice president sales and in October 1999 senior vice president sales and marketing and customer programs of Arian Space and its subsidiaries. Mr. Bartluccie started his carrier with airbus industry as contract manager in 1982. In 1985 he was promoted as business development director of customer service directorate. Then he joined the Matra Defense 1998 as Sales and Marketing Manager in Asia. Mr. Bertolucci holds degrees

from the EHE Commercial Business School and Institute of Etude Politics Paris.
Mr. Bertolucci please.

Thank you very much Mr. Chairman. Good morning ladies and gentlemen.
It is my great honor to be with you today. I would like to apologize for the absence of my CEO Mr. Jean Le Gall who has been retained in Paris in very urgent matters.

I regret not to have been to Japan couple of weeks ago for cherry blossom, it would have given me opportunity to attend the last successful launch of HIIA which was the fifth consecutive success of HIIA. And I think that Japan should be congratulated for this achievement.

I would like to take the opportunity of being with you today to go through charts, which are highlighting of context of the launch services of the entire world.

What we can see on this chart that there are many launch systems. Japan we have the HIIA and China have Long March in India there is GSLD, which is supposed to be launched for the second time very soon after first successful launch. In Russia we have Sayuz and Proton very soon we should have Angara. In Europe we see the launch base in south America. In Europe we have Arian and in the US there are 2 geo-stationary launch systems - Delta and Atlas. In the Pacific in fair international venture we have C-launch. So there are definitely many systems which are currently existing around the world.

If we look at market projections for GTO geo-stationary satellites we can see that the current market is very low. And we may expect certain recovery in the second part of the decade. But currently the market is very low.

In fact many new systems have been introduced. INFiles has been introduced in 1996 since the C-launched has been introduced. The HIIA , Proton A, Atlas 5 and Delta 4. So clearly there is unbalance between the low level of the market and the number of new systems, which have been introduced on the market.

If we look at the blend of government launches and commercial launches, we can see that each launch system has its own mixture of issues. HIIA has been launched on the government's payloads and the other extreme is C-launch, which has only commercial

payloads. Between these two we have the other systems, which are relaying on different combinations of government and commercial payloads.

Looking at the market share we see that many players are fighting for very small market share and that may not give them the opportunity of really being free established on the market as tool commercial provider.

Let's look at the commercial market prospects. Currently the market is low due to the coincident of replacement satellite cycle and telecommunication financing crunch. The consequence is that bios are more selective in terms of both quality and price. We remark that delayed orders may increase the pressure on the satellite delivery and launch schedules. So the commercial market is changing quickly and pressure on providers is dramatically increasing.

Looking at the ITs of launch services we can see that it requires very costly technological development for sure. Technology is difficult; launchers are always looking for very optimized solutions. They require very long cycle of return of investment. Conversely the initial on decisions is very important. There is very long way from launch to service and what the customer is demanding is not the launch is the service. And it will be more and more like that in the future. This is a risky business so things, for example market positions are changing very quickly or may change very quickly.

We have remarked that commercial users prefer government launches. That is giving them the guarantee that the system will stay whatever difficulties it can occurs. Launch providers with responsibility with national security we should not forget that independent access to space is the basic reason for the launch system development.

So let's look at government's users demand. We may say that the responsibility for the national launchers to provide some form of national security. Government and commercial users need racketing closer as both government and commercial users are demanding in the same manner reliability, availability, flexibility and cost – low cost. Definitely over the past years we have remarked that the government users grown more assertive in commercial like quality and cost demands. That is leading to some form of the definition of the role of national launches. Currently commercial market can not support launch if development is included, but commercial launches are needed.

There is a need of redefining the role of national launches and launch services for the government and the commercial markets.

In our opinion we feel, that international cooperation should be a key fro this definition. So let's have a quick look at the European strategy for launches. There is a European strategy through the development and support of launches. Arian 5 is a heavy launch vehicle, VEGA has a light vehicle and Sayuz, which could be installed in co-starting in 2005 as a medium launch vehicle. This strategy is for optimizing resources in order to address all market segments. Arianspace is and will be in charge of operating all launch programs whatever they are in the next years.

Some words about Arianspace. This is the first commercial launch service company. We have 23 years of launch experience. We have obtained more than 250 launch contracts we performed 151 launches till today. We have 40 satellites in our order book from 1.3 tons to 6.7 tons it means the lightest telecommunications satellite in production currently and the heaviest one. It's by far the largest order book in the industry. The shoulders are spread out all of the Europe, Italy, Germany, Belgium, France, Spain, 14 countries from Europe are associated to Arian program.

Let's look at the European context in which Arianspace is working. Wide from the beginning Arianspace has invented customer friendly launch services and transparency, which is very important for building confidence within the community: customer, manufacturers or insurance. Arianspace enabled development of commercial satellite communications and add civilian launch market. In the last 23 years we saw very dramatic development of satellite telecommunications. This European achievement was worked about by European government and continuous commitment to space activities for more than 30 years. We can see also that Europe's governments markets will remain stable but small compare to some others in the next few years.

The strategy for the next years is to continue with blended and balanced market bases providing government launch services even thou the market is not as big as we could expect. And continuing to aim at leading position on the commercial market. We are looking at concentrating the launch activities on few launch versions as far as heavy launch family is concerned. We're ultimately aiming at using only one version of Arian 5. We plan to continue with due launches as the right way to provide the affordable launch solutions to customers.

As a conclusion I would like to say that the we have to invent launch services as we did at the beginning of the 80's. the overall quality is a key to satisfy all users whether they are, government or commercial operators. Governments have mutual roles to play in making the quality to demand. Public and privet sectors, the world over currently clearly revisiting the respective roles and in the context of over supply and prices which do not reflect causes we feel that the international cooperation should be the key to this redefinition.

Thank you.

Q:
I appreciate if you would elaborate a little bit on your comment that commercial users prefer commercial launches, which government launchers you were talking about and which commercial users use them?
A:
Over the recent years there were some ventures which explored the possibility of developing privet launches. Most of them did not materialized in any manner. And looking at the what the market is demanding, looking at the commercial laboratories established satellites operators all of the world, the demand launchers which are backed by governments whether it is for financial reasons because of this taking terms of money is very important for them, whether it is in terms of liability, because whenever you launching hundreds of tons of fairly explosive materials, you earn risk to privet properties and human lives over the trajectory your flight is performing. And it is also in terms of technology because the amount of technology which is concern by a launcher is such that only very strong making by governments is making that happening. So it is why I have the feeling that this relationship between the government and government backed launchers and commercial operators will remain in the next years.
Q:
I have 2 questions that are connected. Let me ask them both and maybe you have one answer that address the both questions.
The first is: about half way of your presentation you had this chart that's said that commercial market could not supported a launcher if development was included and you said something about new model was needed at that time or needed because of that.

But the world has seen the number of new rackets in the last few years that's been Arian 5, HIIA, Delta 4, Atlas 5 so I don't quite understand the connection of your comment in the needs today when they have already been several new launchers developed in presumably the development cost uncovered.
And the second part of the question is that you had a several points on your charts that international cooperation is key but you didn't defined what you meant by that.
So can you comment a little bit more on the model that you see in the future nad why it is necessary to develop new rackets and how the international cooperation will be the key to that.
A:
Thank you for your question – it's giving me the opportunity to clarify the confused point of my presentation.
In the 80's when the Arian program begun to be commercialized it was clearly program relying on some government backing and looking on some commercial perspectives. So there was misbalance of government and commercial activities, which was making this program possible. This model has been copied in 90's by some others expecting to look at some successes on commercial market for making the government launchers affordable. The market projections on which this strategy is based did not materialized, as all of us know. And due to that, the business plan, the perspectives, the hypothesis, the models of development for these launchers were totally unbalanced, totally mixed up. That is why we need redefinition of the role of the government and commercial market. In order that we find any caterpillars between these two, in order we have reliable operations of launchers worldwide.
Simultaneously there are many launch systems all around the world. And the market government or commercial because the government market is not that large also. And all these system are not sure at all. So the launch system is something what is totally strategic all of us understand that, but in order to find viable model for the forthcoming decade. I think that more international cooperation is needed in order to make sure that each of remaining launch systems will find its space.