Course on E-Business
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Lecture 33 Digital Payment Systems

Welcome back. We will continue with the same series of talking about security in the web based system.

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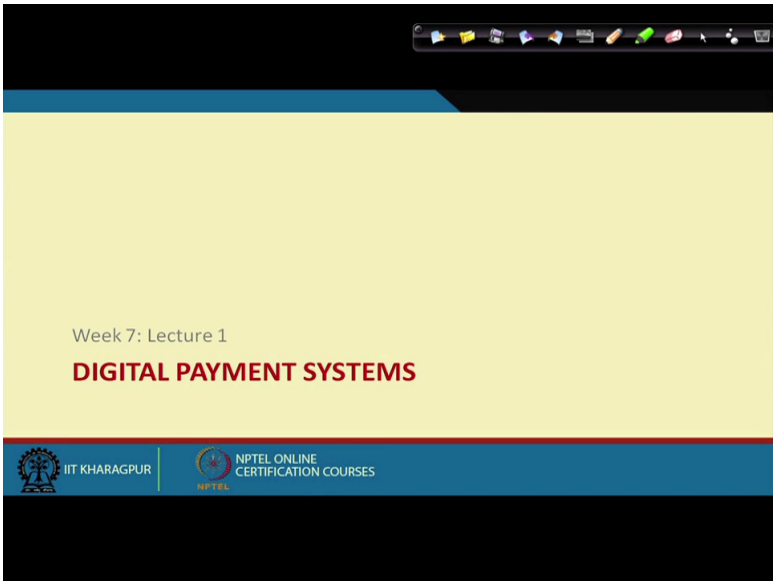

In your e business system and today we are going to discuss about one important concept which is about digital payment systems.

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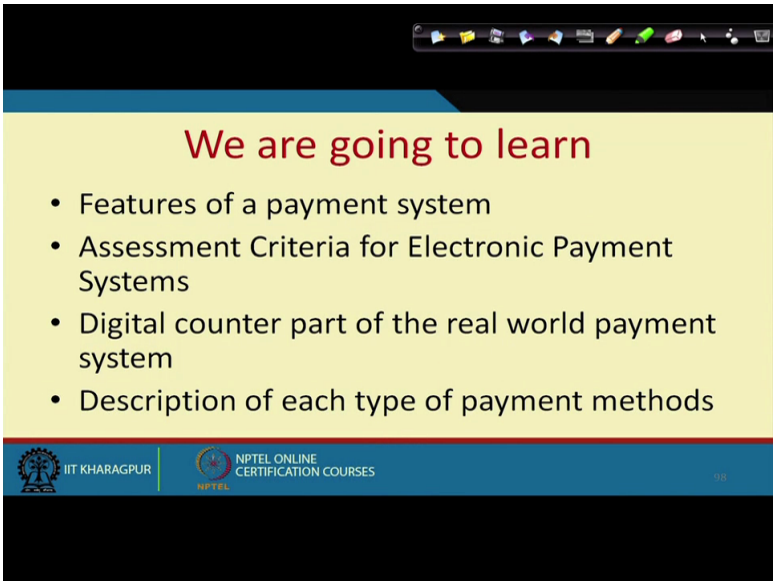

So in this lecture we are going to learn about the features of a payment system, assessment criteria for electronic payment system, then digital counter part of the real world payment system and description of the payment methods.

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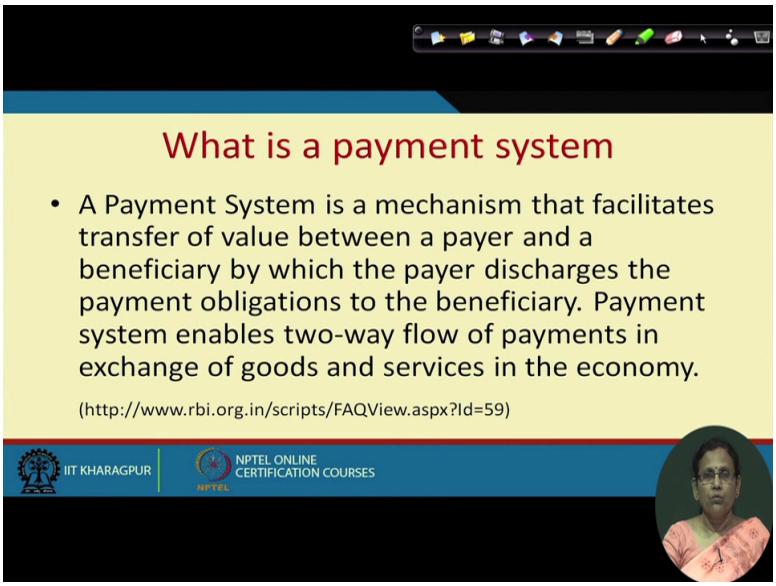

To start with lets see what a payment system is about? A payment system is a mechanism that facilitates transfer of value between a pair and a beneficiary by which the pair discharges the payment obligations to the beneficiary. The payment system enables two way flow of payment in exchange of goods and services in the economy. Okay. Let's try to understand a little bit on this definition what payment system is?

The a payment system is a mechanism that facilitates transfer of value between a pair and a beneficiary by which the pair discharges the payment obligations to the beneficiary. Look when in a transaction, you carry out a transaction buy a book you pay cash. Suppose you pay cash now or most of the transactions are becoming electronic but assume that you pay cash. Now when you pay cash, cash is what? Some piece of paper.

So when you pay that piece of paper why the other party assumes that it is actually value for that particular book. You could have exchanged something else because if can your shopkeeper take some paper from you instead of the money now money is have some other characteristics because of which the shopkeeper takes money from you in exchange of the book.

Think of earlier days in earlier days people use to exchange in a button system people use to exchange things for things. If somebody is selling rice somebody is selling some vegetable then they can exchange it because they understood that value of that vegetable is same as the value of the rice. Now how come a piece of paper becomes that valuable and it enabled the flow of payment?

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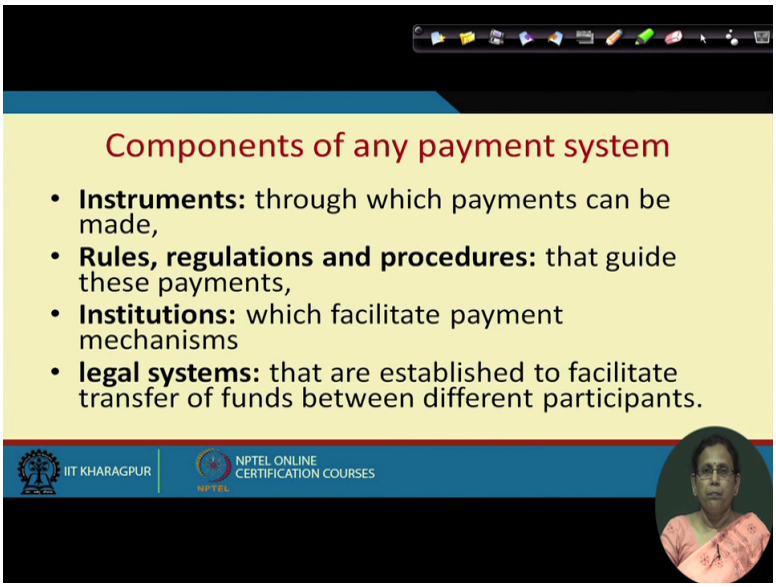

Because the the instrument that you are using your money is one instrument is certified by somebody. In India it is reserve governor of The Reserve Bank of India will certify it. Let us try to understand what is the components of any payment system? First of all the instrument. Here in this particular example your instrument was the cash a Note Hundred rupee note some 500 rupees, 2000 rupees note etc.

Now there are certain rules and regulations and procedures. What are the other instruments? What are the other instruments? Other instruments are your cheques, demand drafts and so on. There can be many other instruments and (())(4:12) Electronic instruments are there. Now through which the payment can be made. So there has to be some rules and regulations and procedures that guide this payment procedure.

Then there are some institutes that facilitate the payment mechanism like that of your banks. They has to some legal system which establish the facilitates rather the transfer of fund among various participants. Participants are the banks entities who are connected with the bank and so on. So possibly in our country your RBI provide such kind of legal system.

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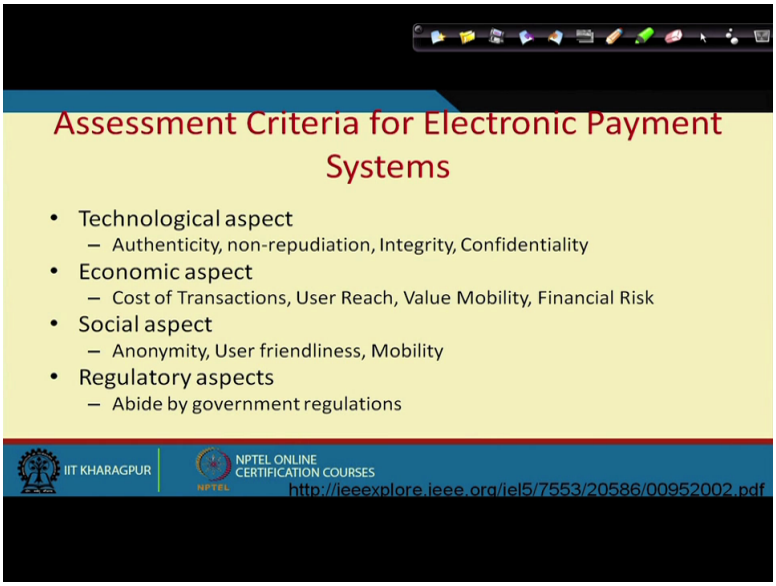

Now when you go for making electronic payment your and you are going to make the the electronic equivalent of the regular payment entities many items many important criteria need to be considered. First the technological aspects like authenticity, non-repudiation integrity, confidentiality etc need to be maintained. Two sider example let us try to understand that let's say what is after all when you do electronic transaction.

What exactly you send? After it is some some data only you send. So when you send this data suppose you send that file which contains the data about the payment to the other entity who is receiving it. That that other entity may say that it has not received it because your Internet is after all insecure medium. The Other entity can say that he has not received it what are you going to do? So you have to deal with this non reputation thing.

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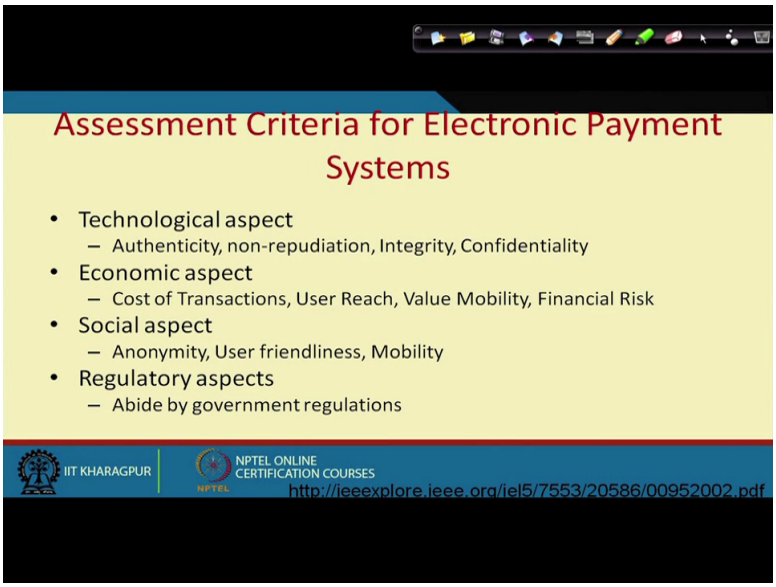

Similarly authenticity whether you are sending it to the right entity or not? Integrity whether the amount that you are you are sending 10000 rupees it should not become 50000 should not become 5000. So similarly if you are sending some money confidentiality should also be maintained. So all the security categories has to be taken care then there is some economic aspect of it.

The cost of the transaction should not be very high it should be in the user's reach. Then there should be value for mobility by value for mobility we need. When it goes from one hand to the other if lets say we are thinking of some cash equivalent if it is going from one person to the other the second person should be able to use it. It should be mobile then the financial risks associated with this.

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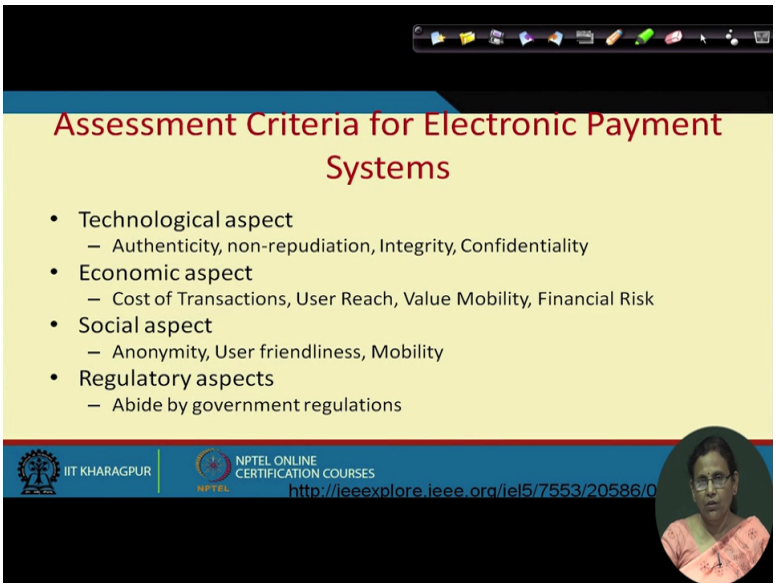

Now of course we are quite safely we are doing on the transactions on the time. So probably electronic payment systems are quite stable now so we do not have much finance but time to time we find that there are some incident happening which does some introverts actually coming in and creating havoc in the system. So this financial risk should be handle social aspects.

It has many social aspects associated with it like anonymity. By anonymity we mean in the corresponding physical world when we do the transaction with cash do we attach our identity with the cash? No. Problem it is not true for other instruments for at least for cash it is there. So there should be if at all we would like to have some kind of anonymous transaction that aspect must be maintained.

It should be user friendly and mobility about I was talking about. Then regulatory aspect just like in the physical world you should have in regulatory authority to take care of the transactions. If there is any problem happen during electronic transaction there should be somebody to resolve it.

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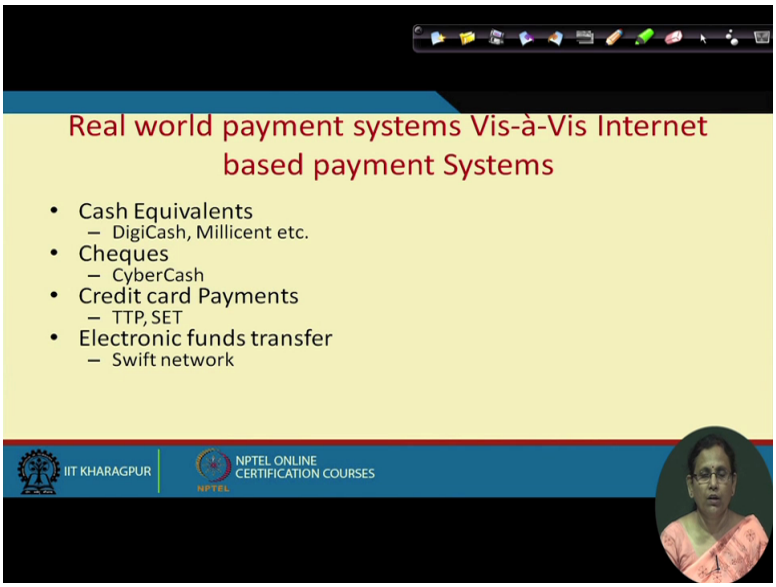

Now let's try to see what are the real world equivalent in the electronic world? There are certain cash equivalent like digital cash etc etc. There are certain cheque equivalent like your cyber cash. There are some credit cards you can over the web you can do credit card transactions. Then there will be through trusted third party. They can electronic fund transfer with your swift network.

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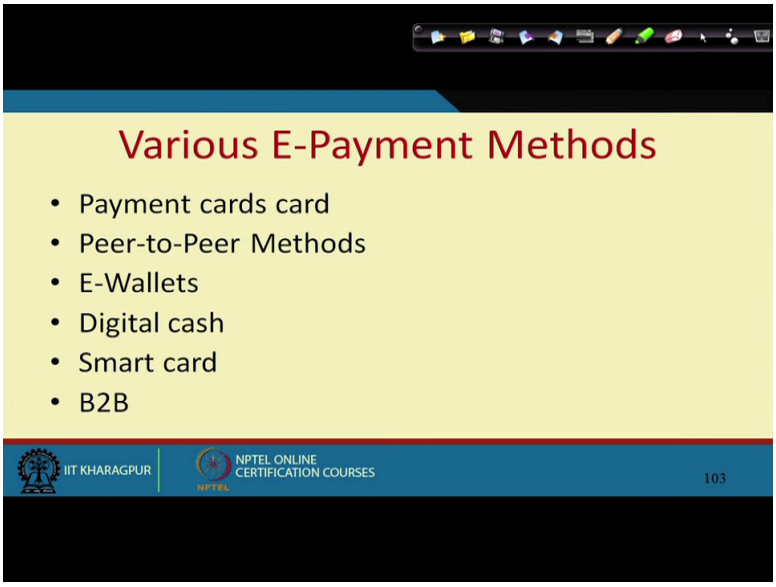

So now let us go through various e payment methods and try to see how they work. So first one is your payment use of payment cards payment payment cards.

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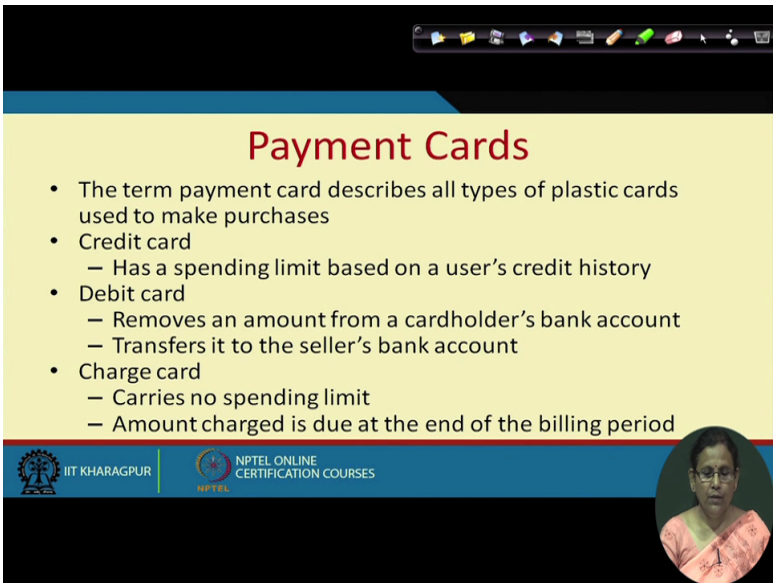

So the term payment card describes that all types of plastic cards used to make purchases. This includes credit cards that has some certain spend limit based on credit history. You can have debit card which directly helps removing the money from the bank card holders bank account. Then you can have charge cards which carries no spending limit the amount of charge is due at the end of the billing Period.

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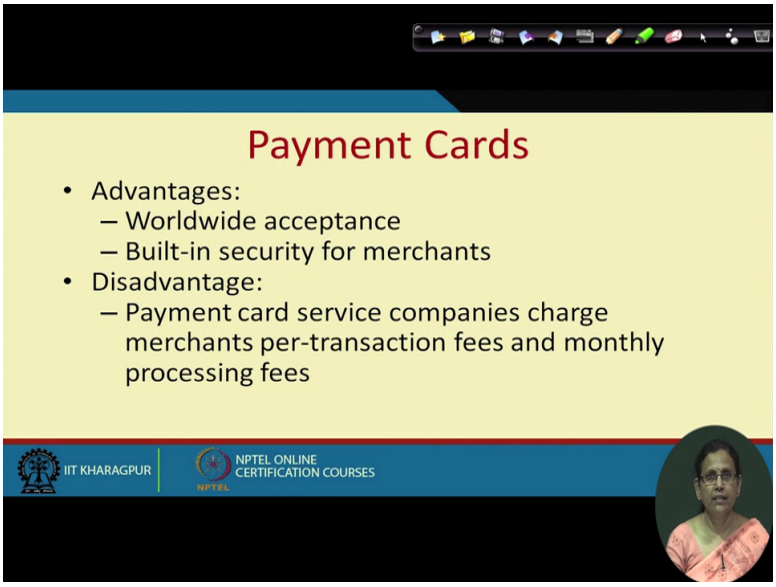

There are many advantages and disadvantages associated with it. Of course first advantages worldwide acceptance of those cards, then they already have a built-in security mechanism in the real world which helps. Disadvantages payment card service companies charge merchants

per transaction fees and monthly processing fees which the merchant may not like unless otherwise there is some regulation from government side.

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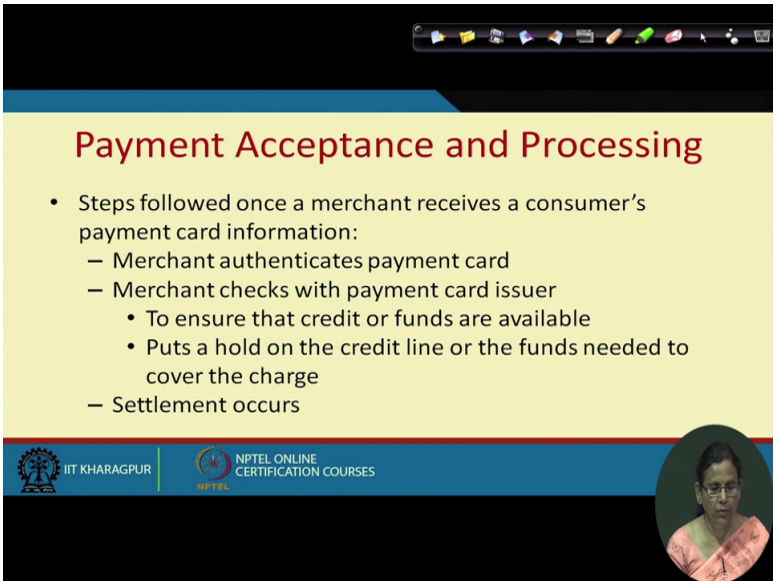

Then let's talk about how through this when we do the transactions through this cards how the payments are accepted and processed? So some steps are followed while you use the card payment. The Merchant authenticates the payment card. Merchant is somebody with whom you are doing the transaction. Merchant checks with the payment card issuer to ensure that the credit of funds credit or the fund you are within the well within the limit.

Then puts a puts a hold on the card card line on the funds needed to cover the charge then a settlement occurs.

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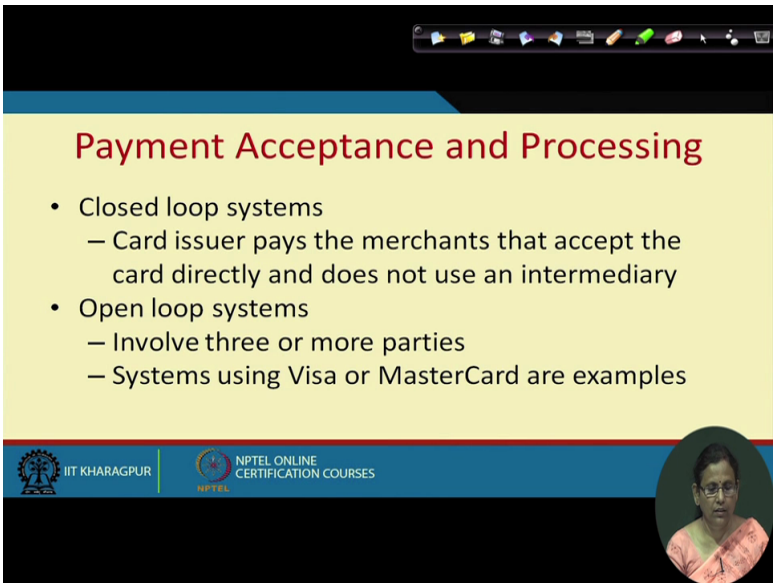

Let us look at what are the settlement processes? There are certain closed loop system where the card Issue issuer pays to the merchant that accept the card directly and does not use an intermediary. This happens like in Excelsior American Express etc where they are not attached to any bank. There are some open loop system which involves three or more parties. for example your visa and master card they are attached to the banks.

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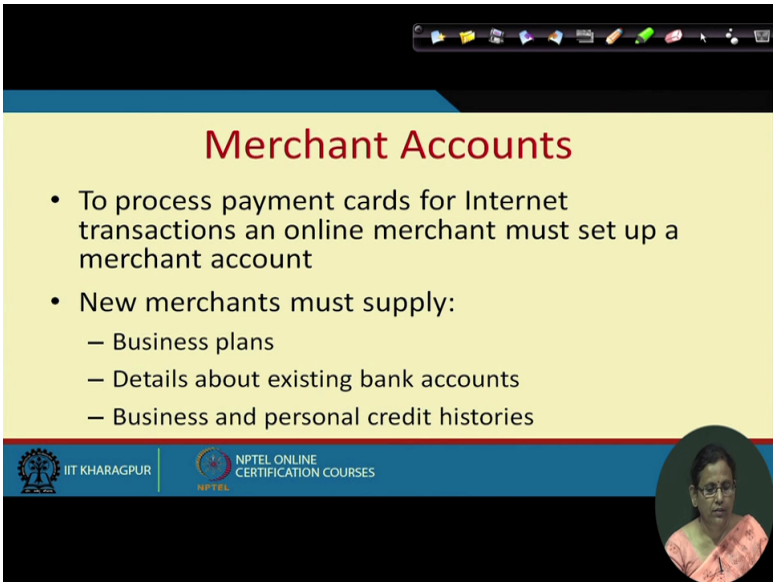

During this process the merchant accounts the the person who is supposed to receive the money they must have some account merchant account. Now to process the payment card for Internet transactions on online merchant must set up a merchant account. New merchant

account in the Merchant account if you have to have then he has to provide his business plans, details about existing bank account and business and personal credit histories.

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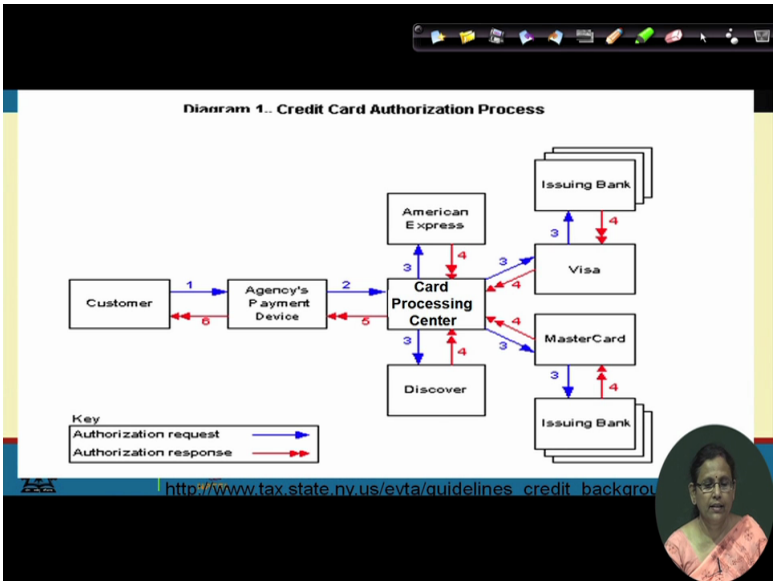

Let us see as I told you during card transactions, first the authentication takes place then the settlement takes place. So during when you swipe your card credit card in your device which in turn communicate it or first we'll be talking about when you swipe your card because that is the fast way of electronical communicating your details.

So the customer when you will be swiping it in the agencies payment device the card details will be going to Card processing centre from there depending on the nature of the card it will be going to to the respective company. As I was telling you there are some systems in which the card company themselves directly paying to the agency like your American Express etc. But in other and over there are companies like visa.

And master card where the credit information will go to the visa and visa will now connect to the issuing bank and that authorisation it will send back the authorisation response.

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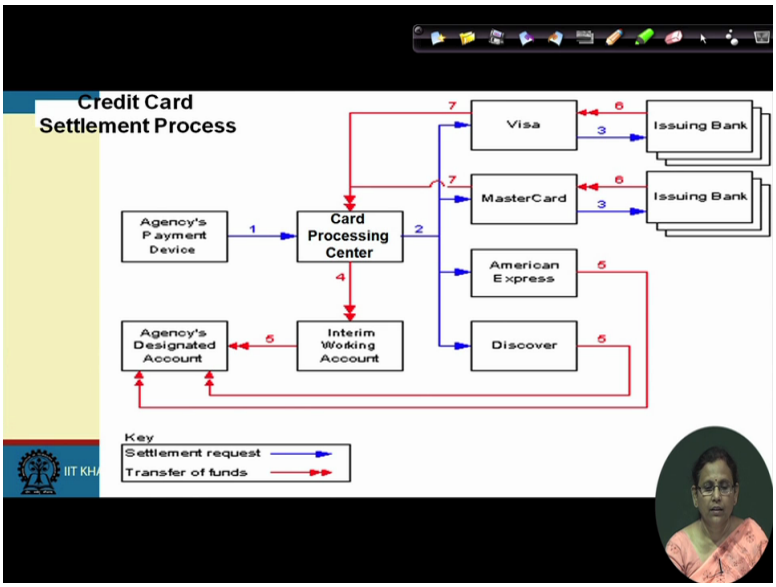

And during this settlement process after it is authorised and its no no it is known that it is sufficient fund is available then Agencies payment device makes the payment settlement request then which in turn is is going to all these credit card companies as you can see this american express and discover they will be directly sending their money to the agency is designated account.

Where are these master card and visa in the companies like master card and visa they will be taking help of the issuing bank and send the money through the card processing Centre to the some (())(15:32) account which letter on gets settled and goes to the Agencies bank account. So this is your credit card settlement process.

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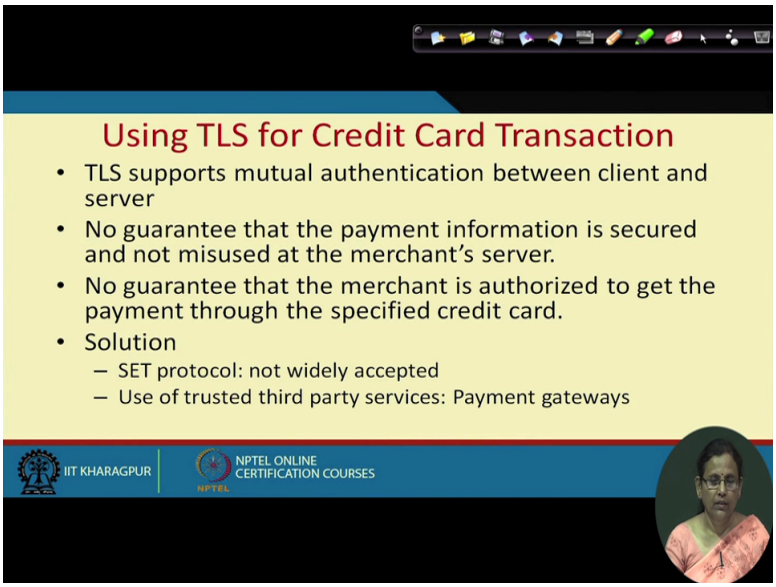

Now during this transaction when information flow should we be using this TLS protocol. Of course using TLS protocol over the Internet when the data is sent it is secure but is it truly a payment instrument? Let us try to understand it. TLS supports mutual authentication between client and server.

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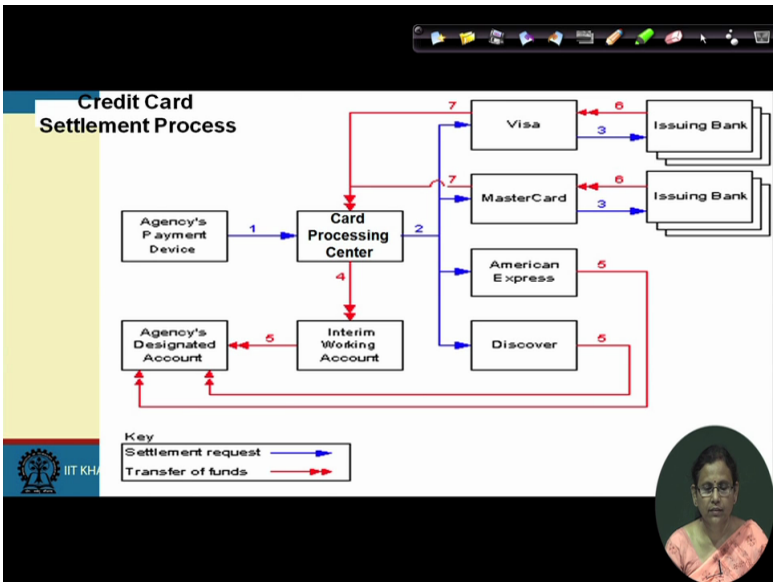

Now in case of payment transaction you are going through some kind of card processing centre.

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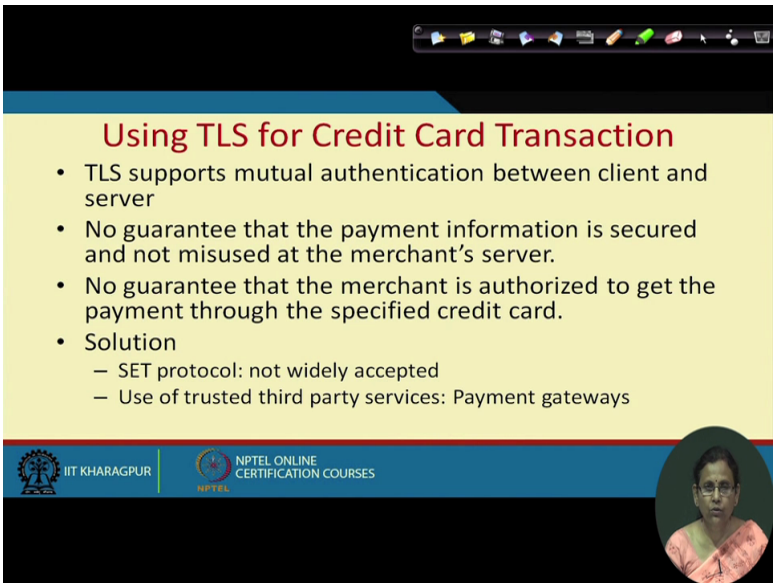

The moment you give your credit card information it is now known to the card processing centre. So the card processing centre you trust that is why you give this information but at the card processing centre your credit card information is now known. So therefore but ideal what happened ideally?

This credit card information should not even having should not even been known to anybody other than the other than the you know like the companies like visa etc. Credit card companies. But it is not it is now known to the other part somebody elsewhere which ends your where your TLS transaction ends so which you may not want. So there is no guarantee that the payment information is secured and it is not misused by the merchant server.

So if you are sending your details to the merchant server by giving your credit card details there is no guarantee that merchant will not be misusing it. There is involved there is other party involved. So they should not be misusing it. So there are many Solutions to it. the protocol which was I mean which was been (())(18:02) by this visa, master card, IBM many companies actually contributed to creating a protocol which is called secure electronic transaction protocol SET.

It becomes so secure that the time they can took to do the processing become very high and because of this expensive nature of the protocol of course though initially it was proposed to be adopted it is no more in practical use. So we are not going to discuss about the set

protocol. But right now people are using trusted third party services like payment gateway etc to settle the bills.

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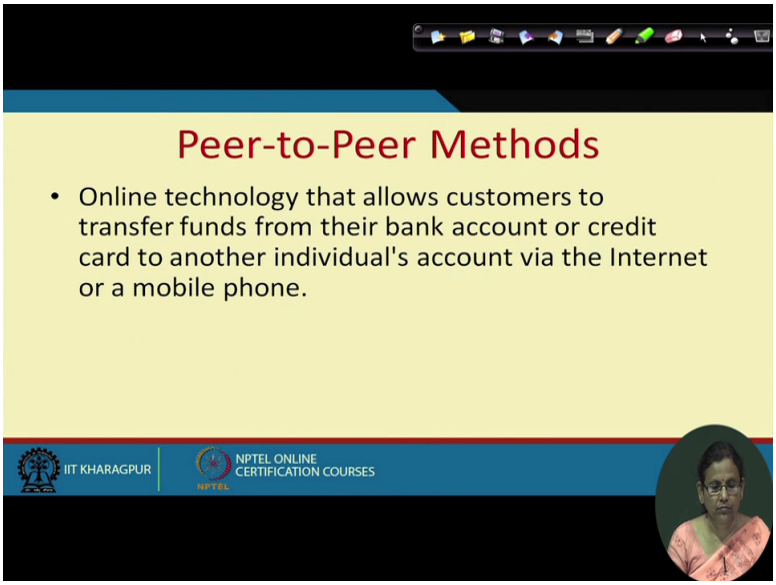

There are many peer to peer methods which is online technology that allows the customer to transfer fund from the bank account or credit card to another individual's account by internet or mobile phone.

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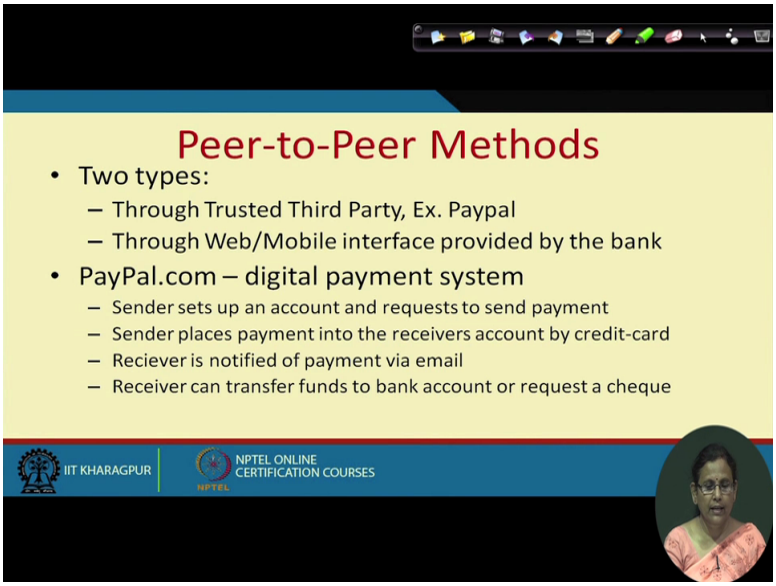

So there are two types of payment methods under this. Through trusted third party like that of paypal or through mobile interfaces provided by the bank. This paypal which is a third party digital payment system. Here the sender sets up an account and request to send the payment.

The sender places the payment into the receivers account by credit card or some mechanism receiver is notified of the payment via email. And receiver can transfer the fund to the bank account or request cheque.

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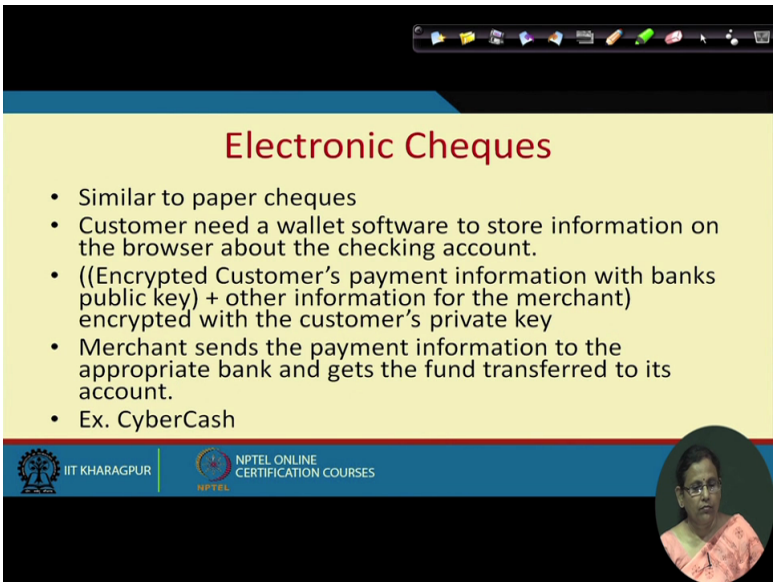

The next physical equivalent is your electronic cheque. They are similar to corresponding paper-based equivalent. Customers need a wallet software to store the information on the browser about the checking account. The encrypted customer's payment information with banks public key and the other information for the merchant are encrypted with the customers privately.

The Merchant send the payment information to the appropriate bank and get the fund transfer to its account example cyber cash.

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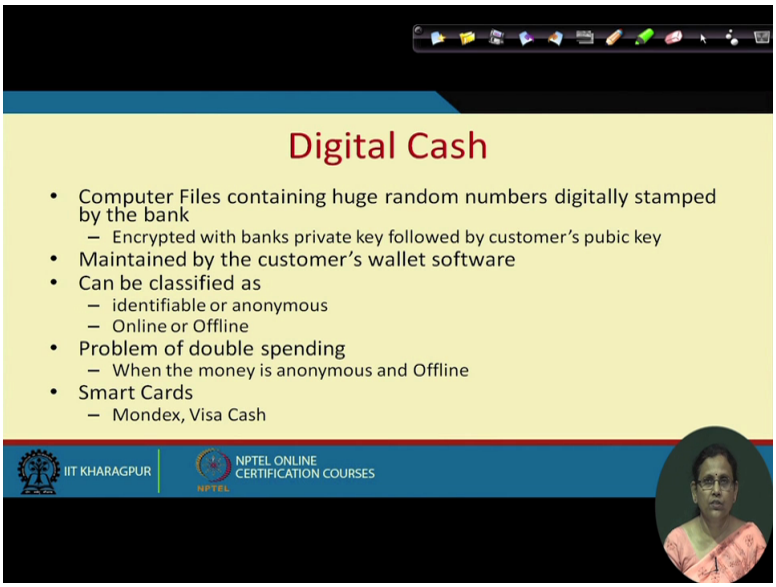

Then Corresponding digital cash corresponding digital equivalent of cash is called in digital cash. So this digital cash are computer files containing huge random numbers digitally stamped by the bank. They are encrypted with banks private key followed by the customers public key so that the customer because it is encrypted finally by the customers public key using customers private key.

So that the customer because it is encrypted finally by the customers public key using customer's private key only customer who has got the money can decrypt it and they can use it. Now because it is encrypted with the banks private key and if somebody knows the banks public key then it is verified that the bank has actually given this money to the customer. Now it is maintained by the customers valid software.

It can be classified as identifiable money, it can be online or offline. So it if it is identifiable then set separate protocol, if it is anonymous then in that separate protocol has to be used. In case it is online the user need to be connecting to the the bank while the transaction takes place and if it is offline even without the banks involvement in between the transaction can take place.

However such money when they are specifically anonymous and offline the problem of double spending comes. Now what is double spending? It is after all a file and the customer customer himself and it is encrypted by lastly by customers public key. So once the customer decrypts it, it is anyway authenticated by the bank by encrypting in the banks private key.

So customer can have multiple copies of the file and use it number of times so proper mechanism to be implemented to avoid double spending. Now corresponding equivalents of digital cash are smart cards like your mondex etc etc.

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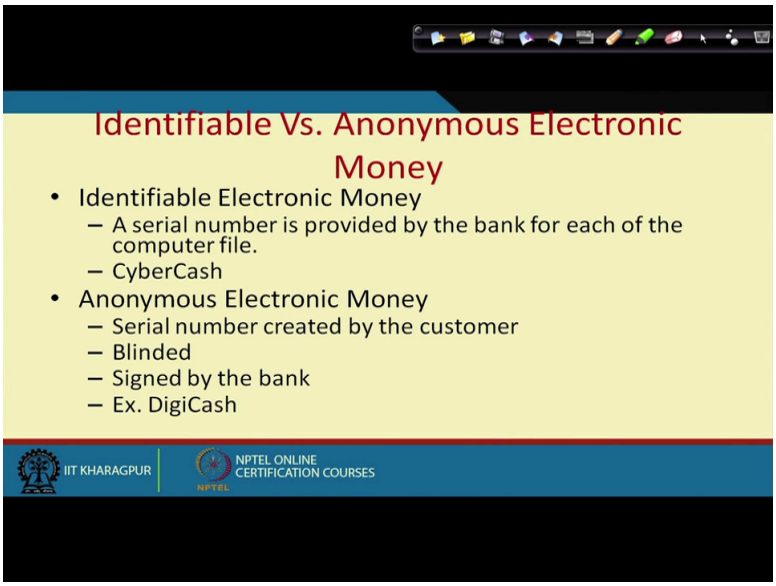

As I was telling you the money can be identifiable or anonymous. In case of identifiable electronic money it is a serial number provided by the bank for each of the computer file. The cyber cash operates like this. In case it is anonymous money a serial number is created by the customer using some cryptographic operation called blinding. It is blinded and on this blinded file now the bank signs it.

So bank now verifies that even if the customer's identity is not known it is actually identifying, it is recognising that that computer file is actually cash.

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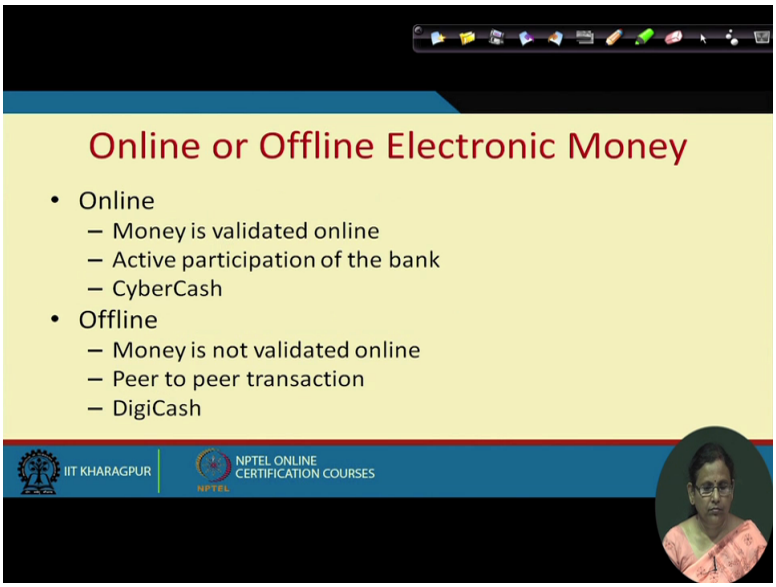

Then let us see the difference between online and offline money. As I was telling you is online money is validated online with the active participation of the bank. Example is cyber cash and offline money is the one which is not validated online with the bank with peer to peer transactions between two users the money can be the money the cash can move.

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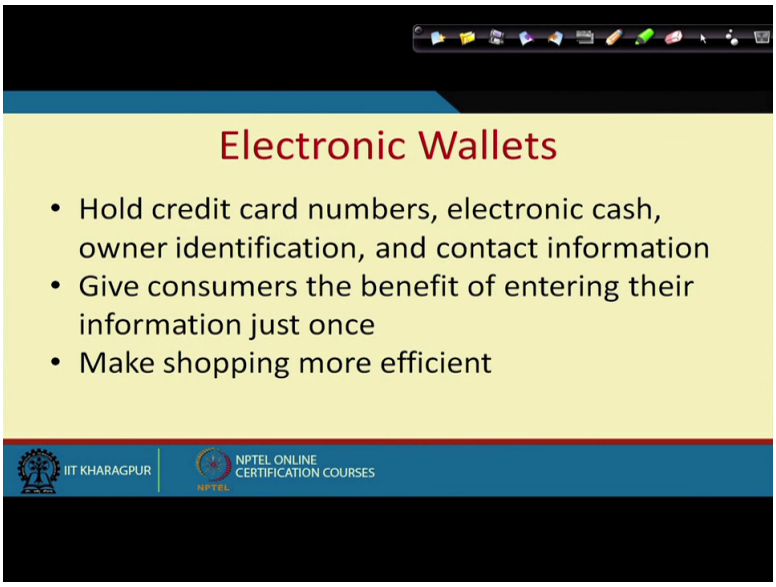

Then the third category is the next category is your electronic wallet. So this electronic wallets hold the credit card number, electronic cash etc of the along with the owner's identification and contact information. They gives the consumer the benefit of entering their

information just once. And as we know electronics have made our lives very easy for shopping.

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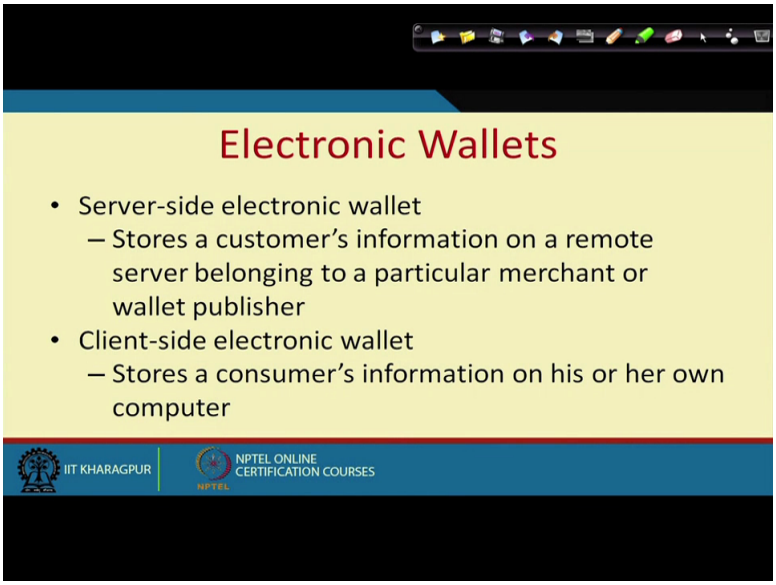

This this electronic wallets can be either server side wallet or it can be client side wallet. In case It's a server side wallet it stores the customers information on a remote server belonging to a particular merchant or wallet publisher. In case it is the client side wallet, it stores the information on the consumers on computer.

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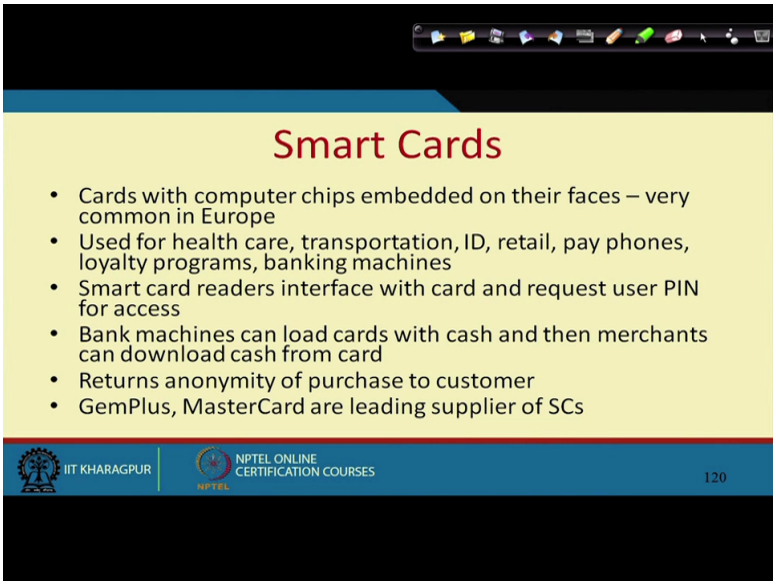

Then you have Smart Cards. This cards have the computer chips on their face. They are very common in Europe and other countries they used for health care, transportation,

transportation, ID, retail, pay phones, loyalty programs, banking machines etc. The smart card readers interface with card and request user pin for access. Bank machines can load cards with cash and then merchant can download cash from the card from the card.

They provide this anonymity to the purchaser as well. This GEM plus, master card are leading suppliers of such Smart Cards.

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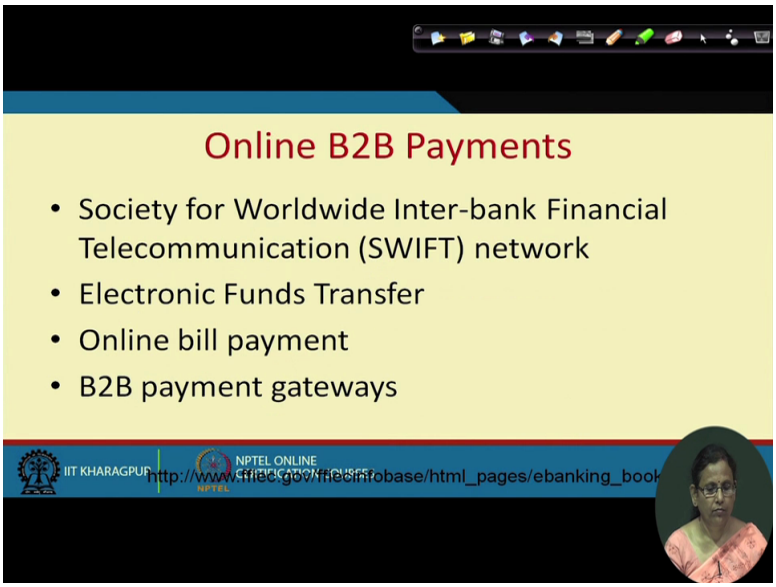

Besides that you have B2B payment mechanism which can happen on Swift network through which electronic fund transfer can take place. Electronic bill payment can take place and there are B2B payment gateway as well. With this we will finish this lecture. Thank you very much!