



What is PICS ?

PICS (Pc Internet Clock Sync) allows synchronisation of your personal computer to any internet time server.

PICS will keep you computer accurate to one second absolute, with no progressive errors. Left to its own devices your computer will not keep accurate time - sometimes varying by up to 30 seconds a day. Not what most people expect from their computers !

Run PICS and your computer clock will be correct.

A Little background information on PC timekeeping

Somewhat surprisingly to most people is that the average PC is a very poor time keeper - outperformed even by the average digital watch. Don't be at all surprised if your PC gains or loses around 10 second / day (Source - NIST)

Personal Computers (PC's) have two clock sources available, a software clock that maintains time whilst the computer is operating and a hardware clock that takes over when the computer is shut down.

The software clock has a number of issues....

The software clock reference period is 54.936 milliseconds. The operating system counts the number of interrupts generated by the software clock and this is used to keep time. Unfortunately for accurate timekeeping, many other computer resources also generate interrupt requests and this effects the computers timekeeping accuracy. The longer your PC is turned on - and the more it is used, the more likely the time is to be wrong. A minute a day is typical (Source - NIST).

The 54.936 millisecond reference period is also far from ideal as it is not a multiple of a second. It can only display values that are even multiples of the time interval between interrupts (55 milliseconds). For example, 00:00:01.00 cannot be generated, the closest times it can actually maintain are 00:00:00.98 and 00:00:01.04. So the nice round values you see on your screen are just an approximation !

When the computer is turned off, the hardware clock runs off batteries. When the computer is turned back on, the software clock starts running again and sets itself (within 1 second) to the hardware clock.

Although the hardware and software clocks are synchronized at power-up, they run at different rates and will gain or lose time relative to each other while the computer is running.

Its timing uncertainty is determined by the quality of the crystal oscillator it uses as its time base. These crystals cost less than \$1 in single quantities and offer only marginal timekeeping performance. They are sensitive to temperature and other factors and their frequency uncertainty is not likely to be better than 1×10^{-5} (about 1 second per day).

In actual operation, most hardware clocks gain or lose about 5 to 15 seconds per day, with 10 seconds per day being typical. Although the hardware clock usually outperforms the software clock, its performance pales in comparison to even a low-cost wristwatch. As you can see, neither the software or hardware clock is suitable for accurate timekeeping.

(Based on information provided by Michael Lombardi, Time and Frequency Division, National Institute of Standards and Technology (NIST))

Why did DTec create PICS ?

PICS was an offshoot of OptiCAL, a high accuracy calibrator for mechanical clocks. Whilst investigating methods to verify the long term accuracy of OptiCAL we investigated the use of internet based time servers.

Unfortunately whilst the accuracy of internet based time servers is very good the resolution is limited to one second making it an impractical tool to calibrate OptiCAL - we can't wait months to see if there's a one second error ! However most of the research was done and so PICS was created.

It didn't take very long to create as its very simple - its been useful for us, so we're giving it away for personal use.

What do I need to run PICS ?

1/ You must have a Windows compatible personal Computer running Microsoft Windows 2000 or later.

2/ You must have an internet connection, it doesn't matter if its dial-up, broadband, wireless etc. PICS corrects for transmission delays so it doesn't matter if it's a slow or fast connection.

You do not need to have an internet browser active, if there is an active internet connection available PICS can operate.

Installing PICS

You should have a single installation file (PICS.exe) which you can download form www.dtec.net.au. Running this file will install PICS on your computer and create an entry in your program list. that's it.

Removing PICS

Oh well, you don't need / like PICS Not a problem, PICS is removed by the "Remove Program" function in the Windows Control Panel. Once again that's all there is to it - no other changes are required to your system.

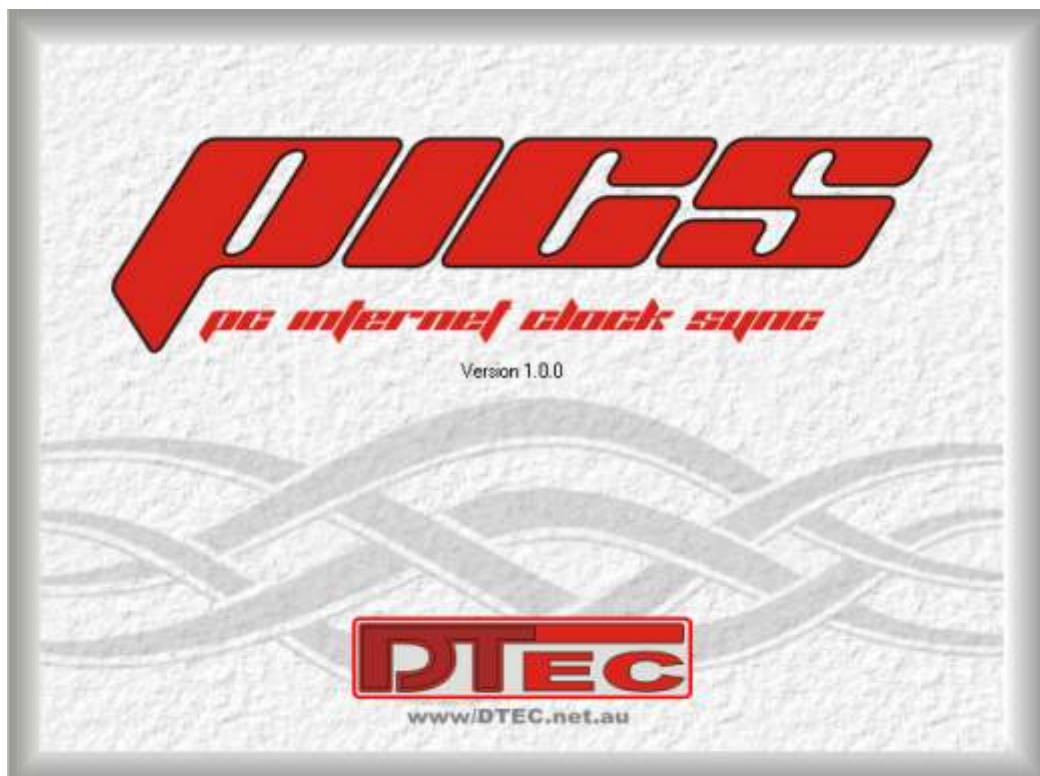
PICS can be installed / removed as many times as required..... although why you would do this.....

Running PICS

PICS is very simple and has few controls. Start it as you do any other installed software.

When started PICS displays its banner screen and after a short delay moves to its main (and only) user menu.

If you use PICs often then creating a shortcut on your desktop might be useful, and of course if you want to have it start every time your computer is on then it can be added to the "Start - Run" group. None of this fiddling is required - they are convenience options.



Using PICS

PICS has two modes, Manual (the default) and Automatic - selected from the “Synchronisation Interval” area on the screen.

When “Manual” is selected, the “Sync Now” button is active. Simply press “Sync Now” and PICS will connect to the Time Server listed in the “Select Internet Time Server” drop-down and progress will be displayed in the “PC Clock - Internet Synchronisation Status” area.

Pressing any one of the Interval buttons (1 Minute to 48 Hours) disables “Sync Now” and PICS will automatically connect to the Internet time server listed in the “Select Internet Time Server” drop-down at the specified interval.

A list of Internet Time Servers is provided in the “Select Internet Time Server” drop-down, select whichever you want. These servers are all run as free public services so they may not be available.

If the “Update Status” window shows no progress then simply select another server from the drop-down and try again.

The screenshot shows the PICS application window titled "PICS - Sync PC Clock to Internet Time Server". The interface includes a top bar with a red power button (labeled "Close PICS"), a "Sync Now" button, and an "Open PC Clock" button (labeled "Opens the 'Set Time' function"). Below this, the "Local PC Time" is displayed as 1:31:18 and the "Local PC Date" as 09-01-28. The "Synchronisation Interval" section contains buttons for "Manual", "1 Minute", "30 minutes", "60 Minutes", "12 Hours", "24 Hours", and "48 Hours". The "Internet Based PC Clock Synchronisation" section features a "Select Internet Time Server" dropdown menu set to "time-a.nist.gov" (labeled "Internet Time Server to connect to") and a "Sync Count" display showing "00000" (labeled "Number of Synchronisation events"). A large empty area at the bottom is labeled "Update Status". The DTEC logo and website URL "www/DTEC.net.au" are displayed at the bottom of the window.



Modifying the Internet Time Server List

A list of Internet Time Servers is provided in the “Select Internet Time Server” drop-down. These servers are all run as free public services so they may not be available and may change over time. Dtec has absolutely no control over the operation of any of these servers.

A quick search of the Internet will show there are literally thousands of servers available, not all however are equally accurate so a little research will allow you to select a server to meet your needs.

We suggest that the server has a known relationship to a Class 1 time reference (i.e. NIST), but of course this is your choice.

PICs loads its time servers from the file *PICS_Internet_Time_Servers.dat* file in the directory where PICS was installed. It is simply a text file (one server per line) that can be edited as required.

Feel free to add and subtract servers as you wish - however the file must contain at least one entry.

The topmost entry is the “default” so you could consider putting your favourite server there to save time.

A Word on Accuracy and Resolution

If you have selected a reputable Internet Time Server the data received will be extremely accurate. Corrections for processing and transmission delays are automatically provided by PICS and many if not all time servers also correct for their own internal processing. So the time data received is usually very accurate.

Resolution is limited to one second (the same as the PC clock)

Just remember Accuracy and Resolution are not the same thing.

Appropriate use of PICs will ensure your computers clock is synchronised to the same second as the Time server with no long term progressive errors.

Its is also unnecessary to synchronise your PC too frequently. If you computer normally keeps time to within 10 seconds a day, then it will loose less than a second / hour. A synchronisation interval of one hour will provide optimum accuracy.

More frequent synchronisation will achieve absolutely nothing. Internet Time Server providers also “frown” upon overly frequent request and may block your service if you place too many request in a short period.

As stated before, frequent requests are pointless.



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